Packaged Literature Search 76-2

Manganese Nodules

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National Oceanic and Atmospheric Administration
Environmental Data Service

This packaged literature search was generated completely by computerized retrieval. It contains citations from the Oceanic Abstracts data base for the period 1964 through June 1976. Citations are arranged by descending citation number. This generally means that citations to the most recently published articles are listed first.

Abstracts for each article cited are available in the publication OCEANIC ABSTRACTS, which is published by Pollution Abstracts, Inc., 620 S. Fifth St., Louisville, Ky. 40202. Abstracts are included in this packaged search only for the year 1967, since at this time the computer searchable file does not contain abstracts for other years.

Questions or comments regarding this packaged search should be referred to Systems Branch, D826, National Oceanic and Atmospheric Administration, Washington, D.C. 20235, telephone (202) 634-7334.

Customized literature searches are available upon an individual's request.

INTRODUCTION

The citations listed deal with the occurrence, chemistry, geology, and economics of manganese nodules. Citations dealing with dissolved manganese, compounds of manganese, ores of manganese, or other such material, have been excluded except when there is reference to nodules. The literature on oceanic manganese is voluminous, and many of its aspects are, by virtue of their size, fit matter for future specialized bibliographies of their own.

Another recently published reference to manganese nodules is Bibliography and Index to Literature on Manganese Nodules (1874-1975), Key to Geophysical Records Documentation No. 6, prepared by M.A. Meylan, B.K. Dugolinsky, and L. Forten, University of Hawaii, IDOE-NSF Manganese Technical Report No. 14, NOAA, EDS, April 1976. Copies of the bibliography are available for purchase from the National Technical Information Service, 5285 Port Royal Rd., Springfield, Va. 22151. Due to the methodology used for both the preparation of the bibliography and this packaged search there is overlap in coverage; however, each document contains a large number of unique citations.

In addition to references to the published literature, the Environmental Data Service's Environmental Data Index (ENDEX) has two files containing references to data on manganese nodules. The Environmental Data Base

Directory (EDBD) contains references to ten data files and the Bottom Photograph Camera Station (Photo) file has references to 772 camera stations distributed throughout the world's oceans that contain bottom pictures of manganese nodules.

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76-02283
PRESENCE EN ATLANTIQUE NORD DE NODULES DE MANGANESE A NOYAUX D'ATTAPULGITE ET DE PHILLIPSITE AUTHIGENES.
BONTE, P.; BRICHET, E.; HOFFERT, M.; JEHANNO, C.; LALOU, C. INSTITUT DE GEOLOGIE, 1, RUE BLESSIG, 67084 STRASBOURG; CEDEX, FR.
Lan: F Publ.Yr: 75 Publ.Type: ACADEMIE DES SCIENCES, PARIS. COMPTES RENDUS HEBDOMADAIRES DES SEANCES. SERIE D: SCIENCES NATURELLES, 281(4): 231-233, JULY 28, 1975.
Descriptors: ATTAPULGITE, HYDROTHERMAL ACTIVITY, JEAN CHARCOT , MADCAP VOLCANO, PHILLIPSITE, ATLANTIC OCEAN NORTH, AUTHIGENIC MINERALS, MANGANESE NODULES, SEDIMENTARY DEPOSITS, VOLCANOES

76-02281
VITESSE D'ACCRETION DES NODULES DE MANGANESE DES FONDS OCEANIQUES.
ALLEGRE, C.J.; BERNAT, M.; BOULAD, A.P.; CONDOMINES, M.; MICHARD, G. UNIVERSITES PIERRE-ET-MARIE-CURIE, PARIS VII INSTITUT DE; PHYSIQUE DU GLOBE, LABORATOIRE DE GEOCHIMIE ET; COSMOCHIMIE, 2-4, PLACE JUSSIEU, 75230 PARIS CEDEX 05, FR.
Lan: F Publ.Yr: 75 Publ.Type: ACADEMIE DES SCIENCES, PARIS. COMPTES RENDUS HEBDOMADAIRES DES SEANCES. SERIE D: SCIENCES NATURELLES, 280(21): 2425-2428, JUNE 2, 1975.
Descriptors: ACCRETION, MANGANESE NODULES, OCEAN FLOOR, PACIFIC OCEAN SOUTH, TUAMOTU ISLANDS

76-01905
IN SEARCH OF EXPLOITABLE ORE DEPOSITS ON THE SEA FLOOR.
ANONYMOUS
Lan: E Publ.Yr: 75 Publ.Type: SOUTH AFRICAN SHIPPING NEWS AND FISHING INDUSTRY REVIEW, 30(5): 36, MAY 1975.
Descriptors: VALDIVIA, DREDGING, MANGANESE NODULES, MINERAL EXPLORATION, MINING, ORE DEPOSITS

76-01890
DEEP SEA SURVEY SYSTEM.
FRISBIE, H.L.; HATCHETT, G.L.; VIGIL, A.E. HYDRO PRODUCTS, 11777 SORRENTO VALLEY RD., SAN DIEGO, CA; 92121
Publ.Yr: 75 Publ.Type: OFFSHORE TECHNOLOGY CONFERENCE: SEVENTH ANNUAL: PROCEEDINGS: VOL. I. (N.P.): OFFSHORE TECHNOLOGY CONFERENCE, 1975. PP. 915-922.
Descriptors: TANDEM PLATFORM ARRANGEMENT, VALDIVIA, DEEP SEA, MANGANESE NODULES, MINERAL EXPLORATION, STABILIZATION, TELEVISION, UNDERWATER SURVEYS

76-01737
DEVELOPMENT OF COMPONENTS FOR AN IN-SITU ANALYSIS SYSTEM FOR THE EXPLORATION OF MANGANESE NODULES.
BIEMANN, W.G.; LANGE, J.P. GESELLSCHAFT FUER KERNFORSCHUNG MBH, WEBERSTRASSE 5, D: 7500 KARLSRUHE, FRG
Publ.Yr: 75 Publ.Type: OFFSHORE TECHNOLOGY CONFERENCE: SEVENTH ANNUAL: PROCEEDINGS: VOL. II. (N.P.): OFFSHORE TECHNOLOGY CONFERENCE, 1975. PP. 585-592.
Descriptors: MANKA II, IN SITU MEASUREMENTS, MANGANESE NODULES, MINERAL EXPLORATION, SAMPLING INSTRUMENTS, TOWED VEHICLES

76-01595
REPORT ON A CRUISE TO STUDY ENVIRONMENTAL BASELINE CONDITIONS IN A MANGANESE NODULE PROVINCE.
AMOS, A.F.; DAUBIN, S.C., JR.; GARSIDE, C.; MALONE, T.C.; PAUL, A.Z.; RICE, G.E.; ROELS, O.A. COLUMBIA UNIV., MORNINGSIDE HEIGHTS, NEW YORK, NY 10027
Publ.Yr: 75 Publ.Type: OFFSHORE TECHNOLOGY CONFERENCE: SEVENTH ANNUAL: PROCEEDINGS: VOL. I. (N.P.): OFFSHORE TECHNOLOGY CONFERENCE, 1975. PP. 143-158.
Descriptors: R/V MOANA WAVE, EFFLUENTS, ENVIRONMENTAL IMPACT, MANGANESE NODULES, MINING, OCEAN FLOOR, PACIFIC OCEAN EQUATORIAL, WATER COLUMNS

76-00999
THE NATION AND THE SEA--A NEW AWARENESS.
WHITE, R.M. NOAA, 6010 EXECUTIVE BLVD., ROCKVILLE, MD 20852
Publ.Yr: 75 Publ.Type: U.S. ENVIRONMENTAL DATA SERVICE. ENVIRONMENTAL DATA SERVICE: 3-11, MAR. 1975.
Descriptors: FOOD SHORTAGES, COASTAL ZONES, ENVIRONMENTAL PROTECTION, FEDERAL POLICIES, FISHERIES, INTERNATIONAL COOPERATION, LEGISLATION, MAMMALIA, MANGANESE NODULES, OIL AND GAS OPERATIONS, POLLUTION CONTROL

76-00998
ECONOMIC SIGNIFICANCE, IN TERMS OF SEA-BED MINERAL RESOURCES, OF THE VARIOUS LIMITS PROPOSED FOR NATIONAL JURISDICTION.
ANONYMOUS
Lan: E Publ.Yr: 75 Publ.Type: OCEAN MANAGEMENT, 2(3): 249-259, APR. 1975.
Descriptors: PROPOSED LIMITS, UN SECRETARIAT, ECONOMICS, JURISDICTION, MANGANESE NODULES, MINERAL RESOURCES, NATURAL GASES, PETROLEUM, SEABED RESOURCES

76-00587
MECHANISM FOR NUCLEATION AND GROWTH OF MANGANESE NODULES.
BURNS, R.G.; BURNS, V.M. MIT, DEPT. OF EARTH AND PLANETARY SCIENCES, 77; MASSACHUSETTS AVE., CAMBRIDGE, MA 02139
Publ.Yr: 75 Publ.Type: NATURE, 255(5504): 130-131, MAY 8, 1975.
Descriptors: IRON COMPOUNDS, MANGANESE NODULES, NUCLEATION, OCEAN FLOOR, ORE DEPOSITS, TODOROKITE

76-00496
MANGANESE NODULES AND OTHER FERROMANGANESE OXIDE DEPOSITS FROM THE ATLANTIC OCEAN.
CRONAN, D.S. UNIV. OF LONDON, IMPERIAL COLLEGE OF SCIENCE AND; TECHNOLOGY, DEPT. OF GEOLOGY, S. KENSINGTON, LONDON SW7; 2AZ, ENG.
Publ.Yr: 75 Publ.Type: JOURNAL OF GEOPHYSICAL RESEARCH, 80(27): 3831-3837, SEPT. 20, 1975.
Descriptors: FERROMANGANESE OXIDE DEPOSITS, ATLANTIC OCEAN, DEPOSITS, GEOCHEMICAL DATA, MANGANESE NODULES

76-00432
THE MORPHOLOGY OF FINELY DIVIDED MANGANESE (IV): OXIDE (NATURAL MANGANESE DIOXIDE).
MELDAU, R.; NEWESELY, H. TECHNISCHE UNIVERSITAT BERLIN, MINERALOGISCHES INSTITUT, 1; BERLIN 12-CHARLOTTENBURG, HARDENBERGSTRASSE 40, FRG
Lan: E Publ.Yr: 75 Publ.Type: STAUB, REINHALTUNG DER LUFT, 34(7): 202-206, 1975.
Descriptors: MANGANESE OXIDE, CRYSTALLOGRAPHY, MANGANESE NODULES, MANGANESE COMPOUNDS, MICROSCOPY, MINERALOGY

75-05962
LAW-OF-THE-SEA AGREEMENT NOW APPEARS POSSIBLE.
ANONYMOUS
Publ.Yr: 75 Publ.Type: SEA TECHNOLOGY, 16(1): 25-26, JAN. 1975.
Descriptors: CONFERENCES, DEEP-SEA MINING, INTERNATIONAL AGREEMENTS, LAW OF THE SEA, MANGANESE NODULES, MARINE POLLUTION, TERRITORIAL WATERS

75-05812
MINING IN THE OUTER CONTINENTAL SHELF AND IN THE DEEP OCEAN.
NATIONAL RESEARCH COUNCIL 2101 CONSTITUTION AVE. NW, WASH., DC 20418
Publ.Yr: 75 Publ.Type: WASHINGTON, D.C.: NATIONAL ACADEMY OF SCIENCES, 1975. 140PP. PRICE: $6.25.
Descriptors: CO, CU, MN, NI, ABYSSAL ZONES, BOOKS, DEEP-SEA MINING, MANGANESE NODULES, METALS, OFFSHORE MINERALS, OUTER CONTINENTAL SHELVES

75-04915
WILL NODULE MINING DISTURB THE MARINE ENVIRONMENT?
ROELS, O.E. COLUMBIA UNIV., LAMONT-DOHERTY GEOLOGICAL OBSERV.,; PALISADES, NY 10964
Publ.Yr: 74 Publ.Type: MARINE TECHNOLOGY SOCIETY. JOURNAL, 8(8): 17-20, SEPT. 1974.
Descriptors: DEEP-SEA MINING, ENVIRONMENTAL IMPACT, INTERNATIONAL COOPERATION, MANGANESE NODULES, MINERAL RESOURCES, PACIFIC OCEAN EQUATORIAL, SEDIMENTS

75-04913
DIE HYDROPNEUMATISCHE FOERDERUNG VON MANGANKNOLLEN AUS DER TIEFSEE.
CHAZITEODORDU, G.; STANGIER, W.; WIENEN, A. RHEINISCH-WESTFAELISCHE-TECHNISCHE HOCHSCHULE AACHEN,; INSTITUT FUER BERGBAUKUNDE II, LOCHNERSTRASSE 4-20, 51; AACHEN, FRG
Lan: G Publ.Yr: 75 Publ.Type: MEERESTECHNIK. MARINE TECHNOLOGY, 6(2): 60-65, APR. 1975.
Descriptors: DEEP-SEA MINING, HYDRAULIC ENGINEERING, HYDRAULIC DREDGES, MANGANESE NODULES, PNEUMATIC LIFT, SEABED RESOURCES

75-04906
NEW INFORMATION ON WORLDWIDE SEABED RESOURCES.
ALBERS, J.P.; MEYER, R.F. USGS, OFFICE OF ENERGY RESOURCES
Lan: E Publ.Yr: 74 Publ.Type: OCEAN MANAGEMENT, 2(1): 61-74, MAR. 1974.
Descriptors: MANGANESE NODULES, OFFSHORE WELLS, OIL AND GAS OPERATIONS, PETROLEUM RESOURCES, SEABED RESOURCES, WORLD OCEAN

75-04840
ENTWICKLUNG EINER SCHLEPPSONDE ZUR "IN-SITU"-ANALYSE VON MANGANKNOLLEN-LAGERSTAETTEN.
LANGE, J.; TAMM, U.; WUERZ, H. GESELLSCHAFT FUER KERNFORSCHUNG MBH, ABTEILUNG; REAKTORBETRIEB UND TECHNIK, KARLSRUHE, FRG
Lan: G Publ.Yr: 75 Publ.Type: MEERESTECHNIK. MARINE TECHNOLOGY, 6(2): 50-55, APR. 1975.
Descriptors: GAMMA RAY SPECTROMETRY, IN SITU INSTRUMENTATION, IN SITU MEASUREMENTS, MANGANESE NODULES, SEABED RESOURCES, TOWED INSTRUMENTS, TOWED SENSORS

75-04574
FERROMANGANESE DEPOSITS OF THE OCEAN FLOOR.
ANONYMOUS
Publ.Yr: 74 Publ.Type: HAWAII. UNIVERSITY. HONOLULU. INSTITUTE OF GEOPHYSICS. HIG-74-9. SEPT. 1974. 249PP.
Descriptors: FORTRAN. COMPUTER PROGRAMS. COPPER. CORE SAMPLES. MANGANESE MODULES. NICKEL. PACIFIC OCEAN EQUATORIAL. SEABED RESOURCES. TRACE MINERALS

75-03857
EXTRACTION AND HAULAGE OF MANGANESE NODULES FROM THE DEEP SEA.
CHAZITEODOROU. G.; WIENEN. A. RHINE WESTFALIA TECHNICAL UNIV.. MINING INST. II.: LOCHNERSTRASSE 4-20. 51 AACHEN. FRG
Lan: E Publ.Yr: 74 Publ.Type: MEERESTECHNIK. MARINE TECHNOLOGY. 5(2): 37-43. MAR. 1974.
Descriptors: EFFICIENCY EQUATIONS. VERTICAL HAULAGE. AUTOMATION SYSTEMS. DEEP-SEA MINING. MANGANESE NODULES. MINERAL RECOVERIES

75-03073
OCEAN FLOOR MINING.
PEARSON. J.S.
Publ.Yr: 75 Publ.Type: OCEAN TECHNOLOGY REVIEW NO. 2. PARK RIDGE. N.J.: NOYES DATA CORPORATION. 1975. 216 PP. PRICE: $24.
Descriptors: DEEP-SEA MINING. ECONOMICS. ENVIRONMENTAL IMPACT. INTERNATIONAL LAW. MANGANESE NODULES. OFFSHORE MINING

75-03053
MANGANESE NODULES (I): MINERAL RESOURCES ON THE DEEP SEABED.
HAMMOND. A.L. SCIENCE. 1515 MASSACHUSETTS AVE. NW. WASH.. DC 20005
Publ.Yr: 74 Publ.Type: SCIENCE. 183(4124): 502-503. FEB. 8. 1974.
Descriptors: COBALT. COPPER. DEEP-SEA MINING. IRON. MANGANESE NODULES. METALS. MICROBIAL ACTIVITY. MINERAL RESOURCES. NICKEL. PACIFIC OCEAN NORTH

75-02304
MICROORGANISMS PARTICIPATE IN THE CONSTRUCTION OF MANGANESE NODULES.
GREENSLATE. J. SIO. BOX 1529. LA JOLLA. CA 92037
Publ.Yr: 74 Publ.Type: NATURE. 249(5453): 181-183. MAY 10. 1974.
Descriptors: SACCORHIZA. BENTHIC FORAMINIFERA. IRON COMPOUNDS. MANGANESE NODULES. MANGANESE COMPOUNDS. MICROBENTHOS

75-01998
MANGANESE NODULES AND INTERNATIONAL LAW.
ANDREWS. W.P., JR. UNIV. OF NORTH CAROLINA. SCHOOL OF LAW. CHAPEL HILL. NC; 27514
Publ.Yr: 74 Publ.Type: EMERGING OCEAN OIL AND MINING LAW. S.W. WURFEL. IN NORTH CAROLINA SEA GRANT PUBLICATION UNC-SG-74-02. MAR. 1974. PP. 30-39.
Descriptors: INTERNATIONAL LAW. MANGANESE. RESOURCE MANAGEMENT. SEABED RESOURCES

75-01990
MOGLICHKEITEN ZUR OPTIMALEN SCHIFFSZEITNUTZUNG BEI DER MARINEN GROSSFLAECHENPROSPEKTION.
AMANN. H. PREUSSAG AG. ABT. MEERESTECHNIK. POSTFACH 4827. 3; HANNOVER 1. FRG
Lan: G Publ.Yr: 73 Publ.Type: MEERESTECHNIK. MARINE TECHNOLOGY. 4(4): 109-113. AUG. 1973.
Descriptors: FREE-FALL PRINCIPLE. R/V VALDIVIA. SEA BOTTOM OBSERVATION. BATHYMETRIC SURVEYS. ECONOMICS. MANGANESE NODULES. MINING. PACIFIC OCEAN. RESEARCH VESSELS. SAMPLING METHODS. SHIPBOARD EQUIPMENT

75-01902
HUGHES GLOMAR EXPLORER BEGINS SEA TESTS OF MINING SYSTEMS.
ANONYMOUS
Publ.Yr: 74 Publ.Type: OCEAN INDUSTRY. 9(3): 32-34. MAR. 1974.
Descriptors: HUGHES GLOMAR EXPLORER. DEEP-SEA MINING. DRY DOCKS. LEGAL ASPECTS. MANGANESE NODULES. SHIP DESIGN. SHIPBOARD EQUIPMENT. SUBMERSIBLES

75-01791
EXPLOITATION OF THE SEA: A PRELIMINARY COST-BENEFIT ANALYSIS OF NODULE MINING AND PROCESSING.
DRECHSLER. H.D. COLUMBIA UNIV.. HENRY KRUMB SCHOOL OF MINES. MORNINGSIDE HEIGHTS. NEW YORK. NY 10027
Publ.Yr: 73 Publ.Type: MARITIME STUDIES AND MANAGEMENT. 1(1): 53-66. JULY 1973.
Descriptors: NODULE PROCESSING. COSTS. MANGANESE. NODULES. UNDERWATER MINING. UNDERWATER ENGINEERING. UNDERWATER EXPLOITATION

75-00453
OCEANOGRAPHY AND MARINE BIOLOGY: AN ANNUAL REVIEW. VOL. 11.
BARNES, H. (ED.) SCOTTISH MARINE BIOLOGICAL ASS'N., DUNSTAFFNAGE MARINE; RESEARCH LAB., P.O. BOX 3, OBAN PA34 4AD, ARGYLL, SCOT.
Publ.Yr: 73 Publ.Type: NEW YORK: HAFNER PRESS, 1973. 385 PP. PRICE: $32.95.
Descriptors: COLLECTED PAPERS, BENTHIC ORGANISMS, BIOLOGY, BIOLUMINESCENCE, BOOKS, BRISTLE WORMS, BROWN ALGAE, FISH, MANGANESE NODULES, OCEANOGRAPHY, SUBMARINE VOLCANISM

74-05842
UNDERWATER CONSTRUCTION AND MINING. A BIBLIOGRAPHY WITH ABSTRACTS.
LEHMANN, E.J. NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD,; VA 22151
Publ.Yr: 73 Publ.Type: GOVERNMENT REPORTS ANNOUNCEMENTS, 73(24): 172, DEC. 25, 1973.
Descriptors: UNDERWATER CONSTRUCTION, ANNOTATED BIBLIOGRAPHY, ABSTRACT ONLY, UNDERWATER MINING, BIBLIOGRAPHIES, EXCAVATION, SALVAGE, MANGANESE NODULES

74-05310
MICROLAMINATIONS IN MARINE MANGANESE NODULES AS REVEALED BY SCANNING ELECTRON MICROSCOPY.
GLASBY, G.P.; MARGOLIS, S.V. UNIV. OF HAWAII, DEPT. OF OCEANOGRAPHY, 2444 DOLE ST.,; HONOLULU, HI 96822
Publ.Yr: 73 Publ.Type: GEOLOGICAL SOCIETY OF AMERICA, BULLETIN, 84(11): 3601-3609, NOV. 1973.
Descriptors: INDIAN OCEAN, PACIFIC OCEAN, LAMINATION, MICROSCOPY, MANGANESE NODULES, MICROLAMINATIONS, SCANNING ELECTRON MICROSCOPY, GROWTH RATES, PETROGRAPHY

74-04884
LAGERSTAETTENFORSCHUNG IN DER TIEFSEE.
ANONYMOUS
Lan: G Publ.Yr: 73 Publ.Type: WASSER, LUFT UND BETRIEB, 17(3): 91, MAR. 1973.
Descriptors: DEEP-SEA MINING, MANGANESE NODULES, PACIFIC OCEAN, FEDERAL REPUBLIC OF GERMANY

74-04854
MANGANESE NODULES (II): PROSPECTS FOR DEEP SEA MINING.
HAMMOND, A.L.
Publ.Yr: 74 Publ.Type: SCIENCE, 183(4125): 644-646, FEB. 15, 1974.
Descriptors: MANGANESE NODULES, DEEP-SEA MINING, PROCESSING METHODS, MINERAL EXPLOITATION, ENVIRONMENTAL HAZARDS

74-04835
MANGANESE NODULES--A FURTHER RESOURCE TO COVER THE MINERAL REQUIREMENTS?
MUELLER, E.; MEISER, H.J. METALLGESELLSCHAFT AG, POSTFACH 2609, REUTERWEG 14, 6; FRANKFURT-AM-MAIN, FRG
Lan: EG Publ.Yr: 73 Publ.Type: MEERESTECHNIK. MARINE TECHNOLOGY, 4(5): 145-150, OCT. 1973.
Descriptors: MANGANESE NODULES, DEEP-SEA MINING, ECONOMICS, MINERAL RESOURCES

74-04810
EXPLORATION METHODS AND TECHNIQUES--EXPERIENCES WITH R.V. VALDIVIA.
KOLLWENTZ, W. METALLGESELLSCHAFT AG, POSTFACH 2609, REUTERWEG 14, 6; FRANKFURT-AM-MAIN, FRG
Lan: E Publ.Yr: 73 Publ.Type: MEERESTECHNIK. MARINE TECHNOLOGY, 4(6): 191-194, DEC. 1973.
Descriptors: RESEARCH VESSELS, R/V VALDIVIA, PACIFIC OCEAN, MANGANESE NODULES, SAMPLING METHODS

74-04425
IDENTIFICATION OF TECHNOLOGIC GAPS IN EXPLORATION OF MARINE FERROMANGANESE DEPOSITS.
MOORE, J.R.; CRUICKSHANK, M.J. UNIV. OF WISCONSIN--MADISON, MARINE STUDIES CENTER,; MADISON, WI 53706
Publ.Yr: 73 Publ.Type: WISCONSIN. UNIVERSITY. SEA GRANT PROGRAM. ADVISORY REPORT WIS-SG-73-404, OCT. 1973. 58 PP.
Descriptors: MANGANESE NODULES, IRON, UNDERWATER MINING, FERROMANGANESE DEPOSITS, EDUCATION, UNDERWATER EXPLORATION

74-04419
NICHTDISPERSIVE ROENTGENSPEKTROMETRIE AN MANGANKNOLLEN AUS DEM PAZIFISCHEN OZEAN.
LUESCHOW, H.-M.; KRAFT, G. METALLGESELLSCHAFT AG, ANALYTISCHEN LABORATORIUM,; POSTFACH 2609, REUTERWEG 14, 6 FRANKFURT-AM-MAIN, FRG
Lan: G Publ.Yr: 73 Publ.Type: MEERESTECHNIK. MARINE TECHNOLOGY, 4(6): 200-204, DEC. 1973.
Descriptors: NICKEL, R/V VALDIVIA, RESEARCH VESSELS, LABORATORY METHODS, COPPER, MANGANESE, IRON, MANGANESE NODULES, PACIFIC OCEAN

74-04418
SURFACE SEDIMENT- AND MANGANESE NODULE FACIES, ENCOUNTERED ON RV VALDIVIA CRUISES 1972/73.
MEYER, K. PREUSSAG AG, POSTFACH 4827, 3 HANOVER 1, FRG
Lan: E Publ.Yr: 73 Publ.Type: MEERESTECHNIK, MARINE TECHNOLOGY, 4(6): 196-199, DEC. 1973.
Descriptors: PACIFIC OCEAN NORTH, MINERAL RESOURCES, SEDIMENTS, MANGANESE NODULES, R/V VALDIVIA, RESEARCH VESSELS

74-04415
THE STATION AND CRUISE PATTERN OF R.V. VALDIVIA IN RELATION TO THE VARIABILITY OF MANGANESE NODULE OCCURRENCES.
SCHULTZE-WESTRUM, H.-H. METALLGESELLSCHAFT AG, POSTFACH 2609, REUTERWEG 14, 6; FRANKFURT-AM-MAIN, FRG
Lan: E Publ.Yr: 73 Publ.Type: MEERESTECHNIK, MARINE TECHNOLOGY, 4(5): 163-167, OCT. 1973.
Descriptors: RESEARCH VESSELS, MANGANESE NODULES, PACIFIC OCEAN CENTRAL, R/V VALDIVIA, OCEAN STATIONS, CRUISE PATTERN, 1972-73, 8 LEGS

74-04414
RESULTS OF DIGITALLY RECORDED SEISMIC FOR MANGANESE NODULES EXPLORATION.
RICHTER, H. PREUSSAG AG, POSTFACH 4827, 3 HANOVER 1, FRG
Lan: E Publ.Yr: 73 Publ.Type: MEERESTECHNIK, MARINE TECHNOLOGY, 4(5): 151-152, OCT. 1973.
Descriptors: MANGANESE NODULES, 1972-73, R/V VALDIVIA, DIGITAL DATA, SEISMIC RECORDS, MINERAL EXPLORATION

74-04410
INTER-UNIVERSITY PROGRAM OF RESEARCH ON FERROMANGANESE DEPOSITS OF THE OCEAN FLOOR.
COLUMBIA UNIV. TORRY CLIFF, PALISADES, NY 10964
Publ.Yr: 73 Publ.Type: GOVERNMENT REPORTS ANNOUNCEMENTS, 73(21): 108, NOV. 10, 1973.
Descriptors: UNDERWATER MINING, MANGANESE NODULES, FERROMANGANESE DEPOSITS, ABSTRACT ONLY, OCEAN BOTTOM

74-04304
FACTORS WHICH CONTROL THE DISTRIBUTION OF FERROMANGANESE NODULES AND PROPOSED RESEARCH VESSEL'S TRACK NORTH PACIFIC. PHASE II: FERROMANGANESE PROGRAM NSF/IDOE.
DELACH, M.N.; HORN, B.M.; HORN, D.R. COLUMBIA UNIV., LAMONT-DOHERTY GEOLOGICAL OBSERV..; TORREY CLIFF, PALISADES, NY 10964
Publ.Yr: 73 Publ.Type: U.S. NATIONAL SCIENCE FOUNDATION. OFFICE FOR THE INTERNATIONAL DECADE OF OCEAN EXPLORATION. TECHNICAL REPORT 8, 1973. 69 PP.
Descriptors: PACIFIC OCEAN NORTH, GEOGRAPHIC DISTRIBUTION, MANGANESE NODULES, CLIPPERTON AND CLARION FRACTURE ZONES, NSF-IDOE FERROMANGANESE PROGRAM, BASALTS, SEAMOUNTS, FRACTURE ZONES

74-03487
IN SITU ANALYSIS OF THE MAJOR AND MINOR ELEMENTS IN MANGANESE FIELDS 211B01159.
NIELSON, H.L.; RIECK, H.G.; WOGMAN, N.A. BATTELLE MEMORIAL INST., PACIFIC NORTHWEST LABS..; RADIOLOGICAL CHEMISTRY SECTION, BOX 999, RICHLAND.; WA 99352
Publ.Yr: 73 Publ.Type: MARINE TECHNOLOGY SOCIETY. JOURNAL, 7(6): 35-40, SEPT. 1973.
Descriptors: MEASURING INSTRUMENTS, MANGANESE NODULES, SEABED RESOURCES, NEUTRON-ACTIVATION ANALYSIS, GAMMA RADIATION, RADIATION MEASUREMENTS

74-03430
METALLIC ORE DEPOSITS AND CONTINENTAL DRIFT.
TARLING, D.H. UNIV. OF NEWCASTLE UPON TYNE, DEPT. OF GEOPHYSICS AND; PLANETARY PHYSICS, NEWCASTLE UPON TYNE, NE1 7RU, ENG.
Publ.Yr: 73 Publ.Type: NATURE, 243(5404): 193-196, MAY 25, 1973.
Descriptors: CONTINENTAL DRIFT, ORE DEPOSITS, METALS, PLATE TECTONICS, MINERAL DEPOSITS, MANGANESE NODULES, OFFSHORE MINING

74-03335
ETUDE D'UN NODULE DE MANGANESE AU MICROSCOPE ELECTRONIQUE A BALAYAGE ET PAR MICROANALYSE X: IMPLICATION DANS LE MODE DE FORMATION DES NODULES.
LE GRESSUS, C.; BRICHET, E.; LALOU, C. CNRS, CENTRE DES FAIBLES RADIOACTIVITES, F 91190; GIF-SUR-YVETTE, FR.
Lan: F Publ.Yr: 73 Publ.Type: INSTITUT OCEANOGRAPHIQUE, PARIS, ANNALES, 49(1): 5-17, 1973.
Descriptors: MICROANALYSIS, GEOCHEMISTRY, MICROSCOPY, ULTRASTRUCTURE, MANGANESE NODULES, PACIFIC OCEAN

74-02595
MANGANESE DEPOSITS OF VARIABLE COMPOSITION FROM NORTH OF THE INDIAN-ANTARCTIC RIDGE.
GLASBY, G.P. DSIR, NEW ZEALAND OCEANOGRAPHIC INST., P.O. BOX 8009.; WELLINGTON, N.Z.
Publ.Yr: 73 Publ.Type: NATURE: PHYSICAL SCIENCE, 242(120): 106-108, APR. 16, 1973.
Descriptors: TASMAN SEA, MANGANESE NODULES, BASINS, SOUTHERN TASMAN BASIN, INDIAN-ANTARCTIC RIDGE, GEOCHEMICAL DATA

74-02564
HAWAII INSTITUTE OF GEOPHYSICS DATA BANKS FOR MANGANESE COLLECTIONS AND HYDRATION-RIND DATING.
LANDMESSER, C.W.; ANDREWS, J.E.; MORGENSTEIN, M. UNIV. OF HAWAII, INST. OF GEOPHYSICS, HONOLULU, HI 96822
Publ.Yr: 73 Publ.Type: HAWAII. UNIVERSITY, HONOLULU. INSTITUTE OF GEOPHYSICS. HIG 73-5, MAR. 1973. 190 PP.
Descriptors: CONCRETIONS, MANGANESE, OCEAN CRUST, PHYSICAL ANALYSIS, DATA COLLECTIONS, MORPHOLOGY, HYDRATION-RIND DATING, FERROMANGANESE OXIDE DEPOSITS, NODULES, UNIV. OF HAWAII, HAWAII INST. OF GEOPHYSICS

74-02528
IN SEARCH FOR COMMERCIAL NODULES, ODDS LOOK BEST IN MIOCENE-AGE PACIFIC TERTIARY SYSTEM.
TINSLEY, C.R. METALS WEEK, 1221 AVENUE OF THE AMERICAS, NEW YORK,; NY 10020
Publ.Yr: 73 Publ.Type: ENGINEERING AND MINING JOURNAL, 174(6): 114-116, JUNE 1973.
Descriptors: MINERAL EXPLORATION, MANGANESE NODULES, PACIFIC OCEAN EQUATORIAL, UNDERWATER MINING INST., NICKEL, PROCEEDINGS SUMMARY, CONFERENCES, TERTIARY, COPPER

74-02432
MECHANISMS OF ENRICHMENT OF THE RARER ELEMENTS IN MARINE MANGANESE NODULES.
GLASBY, G.P. DSIR, NEW ZEALAND OCEANOGRAPHIC INST., P.O. BOX 8009,; WELLINGTON 1, N.Z.
Lan: E Publ.Yr: 73 Publ.Type: MARINE CHEMISTRY, 1(2): 105-125, APR. 1973.
Descriptors: SCOTLAND COAST, AUTHIGENIC MINERALS, GEOCHEMICAL DATA, MANGANESE NODULES, GULF OF ADEN, RARE-EARTH ELEMENTS, ENRICHMENT, LOCH FYNE

74-02393
MARINE GEOLOGY.
WATKINS, N.D. UNIV. OF RHODE ISLAND, GRADUATE SCHOOL OF OCEANOGRAPHY,; KINGSTON, RI 02881
Publ.Yr: 73 Publ.Type: ANTARCTIC JOURNAL OF THE UNITED STATES, 8(3): 69-78, MAY-JUNE 1973.
Descriptors: GEOLOGIC DATA, ANTARCTIC WATERS, SCOTIA SEA, GLACIATION, MANGANESE NODULES, OCEAN SURVEYING, 55 CRUISES, USNS ELTANIN, PHOTOGEOLOGY, SEDIMENTOLOGY, SCIENTIFIC ACCOMPLISHMENTS

74-01533
OCEAN MANGANESE NODULES METAL VALUES AND MINING SITES.
HORN, D.R.; HORN, B.M.; DELACH, M.N. COLUMBIA UNIV., LAMONT-DOHERTY GEOLOGICAL OBSERV.,; TORRY CLIFFS, PALISADES, NY 10964
Publ.Yr: 73 Publ.Type: U.S. NATIONAL SCIENCE FOUNDATION. OFFICE FOR THE INTERNATIONAL DECADE OF OCEAN EXPLORATION. TECHNICAL REPORT 4, 1973. 62 PP.
Descriptors: FERROMANGANESE, METAL VALUES, MINING SITES, DEEP-SEA MINING, MANGANESE NODULES, MINERAL EXPLORATION, WORLD OCEAN

74-01532
METAL CONTENT OF FERROMANGANESE DEPOSITS OF THE OCEANS.
HORN, D.R.; DELACH, M.N.; HORN, B.M. COLUMBIA UNIV., LAMONT-DOHERTY GEOLOGICAL OBSERV.,; TORRY CLIFFS, PALISADES, NY 10964
Publ.Yr: 73 Publ.Type: U.S. NATIONAL SCIENCE FOUNDATION. OFFICE FOR THE INTERNATIONAL DECADE OF OCEAN EXPLORATION. TECHNICAL REPORT 3, 1973. 70 PP.
Descriptors: FERROMANGANESE, COPPER, DEEP-SEA MINING, MANGANESE NODULES, MINERAL EXPLORATION, NICKEL, WORLD OCEAN

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FERROMANGANESE DEPOSITS OF THE NORTH PACIFIC OCEAN.
HORN, D.R.; HORN, B.M.; DELACH, M.N. COLUMBIA UNIV., LAMONT-DOHERTY GEOLOGICAL OBSERV.,; TORRY CLIFFS, PALISADES, NY 10964
Publ.Yr: 72 Publ.Type: U.S. NATIONAL SCIENCE FOUNDATION. OFFICE FOR THE INTERNATIONAL DECADE OF OCEAN EXPLORATION. TECHNICAL REPORT 1, 1972. 123 PP.
Descriptors: RADIOLARIAN OOZE, IRON COMPOUNDS, MANGANESE NODULES, PACIFIC OCEAN NORTH, SEDIMENT SUBSTRATES, SILICEOUS SEDIMENTS

74-01495
SIMILARITIES BETWEEN MN, NI AND CO CONTENTS OF DEEP-SEA CLAYS AND MANGANESE NODULES FROM THE SOUTH-WEST REGION OF THE NORTH ATLANTIC.
CHESTER, R.; JOHNSON, L.R.; MESSIHA-HANNA, R.G.; PADGHAM, R.C. UNIV. OF LIVERPOOL, DEPT. OF OCEANOGRAPHY, P.O. BOX 147,; LIVERPOOL, L69 3BX, ENG.
Lan: E Publ.Yr: 73 Publ.Type: MARINE GEOLOGY, 14(4): M15-M20, MAY 1973.
Descriptors: DISTRIBUTION PATTERNS, NONLITHOGENOUS TRACE ELEMENTS, SOUTHWEST REGION, ATLANTIC OCEAN NORTH, CLAY, COBALT, DEEP-SEA SEDIMENTS, MANGANESE NODULES, MANGANESE, NICKEL

74-01451
URANIUM CONCENTRATIONS IN MARINE SEDIMENTS.
MO, T.; SUTTLE, A.D.; SACKETT, W.M. TEXAS A&M UNIV., COLLEGE STATION, TX 77843
Publ.Yr: 73 Publ.Type: GEOCHIMICA ET COSMOCHIMICA ACTA, 37(1): 35-51, JAN. 1973.
Descriptors: WORLDWIDE OCEANIC CONCENTRATIONS, CARBON, DEEP-SEA SEDIMENTS, GEOCHEMICAL OCEANOGRAPHY, GEOGRAPHIC DISTRIBUTION, MANGANESE NODULES, URANIUM

74-00957
THE TAX REVENUE POTENTIAL OF MANGANESE NODULES.
BRANCO, R. UN SECRETARIAT, OCEAN ECONOMICS AND TECHNOLOGY BRANCH,; UNITED NATIONS BLDG., NEW YORK, NY 10017
Publ.Yr: 73 Publ.Type: OCEAN DEVELOPMENT AND INTERNATIONAL LAW JOURNAL, 1(2): 201-208, SUMMER 1973.
Descriptors: TAX REVENUES, DEEP-SEA MINING, ECONOMICS, GOVERNMENT REGULATIONS, MANGANESE NODULES

74-00956
SOME LEGAL PROBLEMS OF THE COMMERCIAL EXPLOITATION OF MANGANESE NODULES IN THE PACIFIC OCEAN.
AUBURN, F.M. UNIV. OF AUCKLAND, FACULTY OF LAW, PRIVATE BAG,; AUCKLAND C.1, N.Z.
Publ.Yr: 73 Publ.Type: OCEAN DEVELOPMENT AND INTERNATIONAL LAW JOURNAL, 1(2): 185-200, SUMMER 1973.
Descriptors: GEOGRAPHICAL QUESTIONS, GOVERNMENT POLICIES, LAW OF THE SEA, LEGAL ASPECTS, LEGISLATION, MANGANESE NODULES, MINING, PACIFIC OCEAN

74-00858
FERROMANGANESE DEPOSITS ON THE OCEAN FLOOR.
HORN, D.R.; DELACH, M.; HORN, B. COLUMBIA UNIV., LAMONT-DOHERTY GEOLOGICAL OBSERV..; TORREY CLIFF, PALISADES, NY 10964
Publ.Yr: 72 Publ.Type: WASHINGTON, D.C.: NATIONAL SCIENCE FOUNDATION, OFFICE FOR THE INTERNATIONAL DECADE OF OCEAN EXPLORATION, (1972?). 283 PP.
Descriptors: IDOE, PROCEEDINGS, 1972, CONFERENCES, DEEP-SEA MINING, MANGANESE NODULES, MINERAL DEPOSITS, MINERAL RESOURCES, OCEAN FLOOR

74-00371
ROLE OF BIOLOGICAL FACTORS IN THE SEDIMENTATION OF IRON, MANGANESE, AND COBALT AND IN THE FORMATION OF NODULES.
SOROKIN, Y.I. ACAD. OF SCIENCES USSR, INST. OF THE BIOLOGY OF INLAND; WATERS, BOROK, NEDOUZSKII RAION, YAROSLAVL REGION, USSR
Publ.Yr: 72 Publ.Type: OCEANOLOGY, 12(1): 1-11, NOV. 1972.
Descriptors: BACTERIA, BIOLOGICAL FACTORS, FILTER-FEEDING INVERTEBRATES, PHYTOPLANKTON, COBALT, GEOMICROBIOLOGY, IRON, MANGANESE, NODULES, ORE DEPOSITS, SEDIMENTATION

73-60147
ECONOMIC PROBLEMS AND PROSPECTS FOR EXPLOITATION OF THE RESOURCES OF THE SEA-BED AND ITS SUBSOIL.
CHRISTY, FRANCIS T., JR. RESOURCES FOR THE FUTURE, INC., WASH., DC
Publ.Yr: 71 Publ.Type: SEE CITATION NO. 73-4F-00145, 28 PAGES. .1971? ..
Descriptors: SEABED RESOURCES, MANGANESE NODULES, PHOSPHORITE , ECONOMICS., FISHERIES, OIL AND GAS OPERATIONS

73-50076
USE OF DEEP SEA MANGANESE NODULES AS CATALYSTS FOR REDUCTION OF NITRIC OXIDE WITH AMMONIA.
WU, SHU-CHUAN; CHU, CHIEH UNIV. OF CALIFORNIA, SCHOOL OF ENGINEERING AND APPLIED UNIV. OF CALIFORNIA, SCHOOL OF ENGINEERING AND APPLIED; SCIENCE, DEPT. OF ENERGY AND KINETICS, LOS ANGELES; SCIENCE, DEPT. OF ENERGY AND KINETICS, LOS ANGELES
Publ.Yr: 72 Publ.Type: ATMOSPHERIC ENVIRONMENT. NEW YORK, 6(5): 309-317, MAY 1972.
Descriptors: CATALYSTS, MANGANESE NODULES, NITROGEN COMPOUNDS , POLLUTION CONTROL, AMMONIA, AIR POLLUTION, NITRIC OXIDE REDUCTION, DEEP SEA NODULES.

73-21195
THERMOMAGNETIC BEHAVIOR OF MANGANESE NODULES.
TWISS, E.S.; CARPENTER, ROY; JOHNSON, H.P. UNIV. OF WASHINGTON, DEPT. OF OCEANOGRAPHY, SEATTLE UNIV. OF WASHINGTON, DEPT. OF OCEANOGRAPHY, SEATTLE UNIV. OF WASHINGTON, DEPT. OF OCEANOGRAPHY, SEATTLE
Publ.Yr: 72 Publ.Type: JOURNAL OF GEOPHYSICAL RESEARCH. WASHINGTON, D.C., 77(36): 7163-7174, DEC. 10, 1972.
Descriptors: FERROMANGANESE NODULES., MAGNETIC FIELDS, MANGANESE NODULES, TEMPERATURE VARIATIONS

73-21153
MANGANESE NODULE DEPOSITS IN THE PACIFIC.
ANONYMOUS
Publ.Yr: 72 Publ.Type: MANGANESE NODULE DEPOSITS IN THE PACIFIC. SYMPOSIUM/ WORKSHOP. PROCEEDINGS. (HELD IN HONOLULU, HAWAII, OCT. 16-17, 1972). SPONSORED BY UNIVERSITY OF HAWAII, HAWAII INSTITUTE FOR GEOPHYSICS, HONOLULU; STATE OF HAWAII, OFFICE OF MARINE AFFAIRS COORDINATOR; STATE OF HAWAII, DEPT. OF PLANNING AND ECONOMIC DEVELOPMENT AND NATIONAL SCIENCE FOUNDATION, OFFICE OF THE INTERNATIONAL DECADE OF OCEAN EXPLORATION, STATE OF HAWAII, DEPT. OF PLANNING AND ECONOMIC DEVELOPMENT, STATE CENTER FOR SCIENCE POLICY AND TECHNOLOGY ASSESSMENT, HONOLULU. 228 PAGES. .1972? ..
Descriptors: DEEP-SEA MINING, MANAGANESE NODULES, GEOGRAPHIC DISTRIBUTION, RESOURCE MANAGEMENT, LAW OF THE SEA, MINERAL DEPOSITS, CONFERENCES, SYMPOSIUM/ WORKSHOP PROCEEDINGS.

73-20709
MARINE MANGANESE NODULES: IMPORTANCE OF STRUCTURAL ANALYSIS.
FOSTER, ALLAN R.; SOREM, RONALD K. WASHINGTON STATE UNIV., DEPT. OF GEOLOGY, PULLMAN WASHINGTON STATE UNIV., DEPT. OF GEOLOGY, PULLMAN
Publ.Yr: 72 Publ.Type: SEE CITATION NO. 73-4B-00676 PP. 192-200. .1972? ..
Descriptors: BAJA CALIFORNIA, SEDIMENT STRUCTURES., MANGANESE NODULES

73-20706
SURFACE CONCENTRATIONS OF DEEP-SEA MANGANESE NODULES.
KOEGLER, F.-C. CHRISTIAN-ALBRECHTS-UNIVERSITAET KIEL, GEOLOGISCHES; INSTITUT, FGR
Publ.Yr: 72 Publ.Type: SEE CITATION NO. 73-4B-00676 P. 166. .1972? ..
Descriptors: ABSTRACT ONLY., DISTRIBUTION, MANGANESE NODULES, DEEP-SEA FLOOR, DEEP-SEA SEDIMENTS, PACIFIC OCEAN EAST

73-20525
THE MINERALOGY OF MANGANESE NODULES FROM A RANGE OF MARINE ENVIRONMENTS.
GLASBY, G.P. DSIR, NEW ZEALAND OCEANOGRAPHIC INST., WELLINGTON
Lan: E Publ.Yr: 72 Publ.Type: MARINE GEOLOGY. AMSTERDAM, 13(1): 57-72, JUNE 1972.
Descriptors: DEEP-SEA SEDIMENTS, MINERALOGY, MANGANESE NODULES, SHALLOW WATER DEPOSITS.

73-20522
OLIGOCENE SEDIMENTS NEAR CHAIN RIDGE, NORTHWEST INDIAN OCEAN: STRUCTURAL IMPLICATIONS.
PIMM, ANTHONY C.; BURROUGHS, R.H.; BUNCE, E.T. WHOI, WOODS HOLE, MA SIO, LA JOLLA, CA WHOI, WOODS HOLE, MA
Lan: E Publ.Yr: 72 Publ.Type: MARINE GEOLOGY. AMSTERDAM, 13(1): M14-M18, JUNE 1972.
Descriptors: INDIAN OCEAN NORTH, TERTIARY, MANGANESE NODULES, NANNOPLANKTON, OLIGOCENE, CHAIN RIDGE SEDIMENTS, STRUCTURAL IMPLICATIONS.

73-20427
SIGNIFICATION DES MESURES RADIOCHIMIQUES DANS L'EVALUATION DE LA VITESSE DE CROISSANCE DES NODULES DE MANGANESE.
LALOU, CLAUDE; BRICHET, EVELYNE CNRS, CENTRE DES FAIBLES RADIOACTIVITES, ESSONNE, FR. CNRS, CENTRE DES FAIBLES RADIOACTIVITES, ESSONNE, FR.
Lan: F Publ.Yr: 72 Publ.Type: ACADEMIE DES SCIENCES, PARIS. COMPTES RENDUS HEBDOMADAIRES DES SEANCES. SERIE D: SCIENCES NATURELLES, 275(7): 815-818, AUG. 16, 1972.
Descriptors: MANGANESE NODULES, RADIOISOTOPES., THORIUM, GROWTH RATE

73-20348
INFLUENCE OF MANGANIFEROUS FRAGMENTS ON THE TRACE ELEMENT GEOCHEMISTRY OF PELAGIC SEDIMENTS, NORTH-WEST INDIAN OCEAN.
GLASBY, G.P. DSIR, NEW ZEALAND OCEANOGRAPHIC INST., WELLINGTON
Publ.Yr: 72 Publ.Type: NEW ZEALAND JOURNAL OF GEOLOGY AND GEOPHYSICS. WELLINGTON, 15(3): 451-464, SEPT. 1972.
Descriptors: TRACE ELEMENTS, GEOCHEMISTRY., MIGRATION, INDIAN OCEAN NORTH, PELAGIC SEDIMENTS, MANGANESE NODULES

73-20231
RADIOMETRIC EVIDENCE FOR THE RAPID GROWTH RATE OF SHALLOW-WATER, CONTINENTAL MARGIN MANGANESE NODULES.
GLASBY, G.P.; KU, T.L. UNIV. OF SOUTHERN CALIFORNIA, DEPT. OF GEOLOGICAL DSIR, NEW ZEALAND OCEANOGRAPHIC INST., WELLINGTON ; SCIENCES, LOS ANGELES
Publ.Yr: 72 Publ.Type: GEOCHIMICA ET COSMOCHIMICA ACTA. LONDON, 36(6): 699-703, JUNE 1972.
Descriptors: GROWTH RATE, JERVIS INLET, LOCH FYNE., FIRTH OF CLYDE, MANGANESE NODULES, SHALLOW WATER DEPOSITS

73-20186
MANGANESE NODULES AND BUDGET OF TRACE SOLUBLES IN OCEANS.
KRISHNASWAMY, S. TATA INST. OF FUNDAMENTAL RESEARCH, BOMBAY, INDIA
Publ.Yr: 72 Publ.Type: SEE CITATION NO. 73-1B-00177 PP. 307-320. SEPT. 15, 1972.
Descriptors: RADIOMETRICALLY, DATED SAMPLES., MANGANESE NODULES, AUTHIGENIC DEPOSITION, TRACE ELEMENTS, SEDIMENTARY DEPOSITS

72-60268
HOW MANGANESE NODULES DEVELOP.
GOODIER, J. LESLIE
Publ.Yr: 72 Publ.Type: OCEANOLOGY INTERNATIONAL, 7(4): 45-48, APRIL 1972.
Descriptors: MANGANESE NODULES, OCEAN MINING

72-60265
PROGRESS IN MINING MANGANESE NODULES FROM THE DEEP OCEAN.
FLIPSE, JOHN E.; KAUFMAN, RAYMOND
Publ.Yr: 71 Publ.Type: SEE CITATION NO. 72-3F-0264. 29 PAGES. 1971.
Descriptors: MANGANESE NODULES, DEEP SEA MINING, DEEPSEA VENTURES

72-50622
DEEP OCEAN MINING SYSTEM TESTED.
GEMINDER, ROBERT; LECOURT, EVERETT J., JR.
Publ.Yr: 72 Publ.Type: WORLD DREDGING AND MARINE CONSTRUCTION, 8(8): 35-38, JULY 1972.
Descriptors: OCEAN MINING, DEEPSEA VENTURES, INC., INSTRUMENTATION, DREDGING EQUIPMENT, MANGANESE NODULES

72-50580
TOWING SYSTEM FOR MARITIME ORE EXPLORATION.
DALCHOW, KLAUS
Publ.Yr: 72 Publ.Type: DORNIER POST. ENGLISH EDITION. MUNICH, GER., NO. 1: 36-37, 1972.
Descriptors: OCEAN EXPLORATION, SEABED, TOWED VEHICLES, MANGANESE NODULES, TOWING SYSTEM, METALS

72-21978
SELECTED BIBLIOGRAPHY OF MARINE MANGANESE NODULES.
GLASBY, G. P.
Publ.Yr: 72 Publ.Type: WELLINGTON, N.Z. OCEANOGRAPHIC INSTITUTE. ZNOU RECORDS, 1(2): 5-35, MARCH 1972.
Descriptors: SELECTED BIBLIOGRAPHY, MANGANESE NODULES

72-21964
EFFECT OF PRESSURE ON DEPOSITION OF MANGANESE OXIDES IN THE MARINE ENVIRONMENT.
GLASBY, G. P.
Publ.Yr: 72 Publ.Type: NATURE: PHYSICAL SCIENCE, 237(75): 85-86, JUNE 5, 1972.
Descriptors: HYDROSTATIC PRESSURE, DEPOSITION, PRESSURE EFFECTS, THERMODYNAMICS, MANGANESE NODULES

72-21813
RELATIONSHIP BETWEEN MANGANESE NODULES AND COSMIC SPHERULES.
FINKELMAN, ROBERT B.
Publ.Yr: 72 Publ.Type: MARINE TECHNOLOGY SOCIETY. JOURNAL, 6(4): 34-39, JULY-AUG. 1972.
Descriptors: MINERALOGY, COSMIC SPHERULES, MANGANESE NODULES

72-21169
EIN JAHR DEUTSCHE MEERESROHSTOFF-EXPLORATION.
AMANN, H.
Publ.Yr: 72 Publ.Type: ERDOEL-ERDGAS ZEITSCHRIFT, 88(2): 61-68, FEB. 1972.
Descriptors: RED SEA, MINERAL EXPLORATION, R/V VALDIVIA, MANGANESE NODULES, PLACERS

72-21074
LEAD ISOTOPES IN MARINE MANGANESE NODULES.
REYNOLDS, PETER H.; DASCH, E. JULIUS
Publ.Yr: 70 Publ.Type: SEE CITATION NO. 72-3B-1012 P. 663, OCT. 1970.
Descriptors: MANGANESE NODULES, LEAD ISOTOPES, ABSTRACT ONLY

72-21064
A STUDY OF THE GROWTH MORPHOLOGIES OF TWO TYPES OF DEEP-SEA MANGANESE MEGA-NODULES.
MORGENSTEIN, MAURY E.
Publ.Yr: 70 Publ.Type: SEE CITATION NO. 72-3B-1012 P. 630, OCT. 1970.
Descriptors: MID-ATLANTIC RIDGE, DEEP SEA SEDIMENTS, MANGANESE NODULES, ABSTRACT ONLY, GROWTH MORPHOLOGIES

72-20698
COMPOSITION OF ATLANTIC MANGANESE NODULES.
CRONAN, D. S.
Publ.Yr: 72 Publ.Type: NATURE: PHYSICAL SCIENCE, 235(61): 171-172, FEB. 28, 1972.
Descriptors: MANGANESE NODULES, COMPOSITION, ATLANTIC OCEAN, COMPARISON, PACIFIC, INDIAN OCEANS

72-20275
PHOTOGRAPHING MANGANESE NODULES ON THE OCEAN FLOOR.
EWING, M.; HORN, D.; SULLIVAN, L.; AITKEN, T.; THORNDIKE, E.
Publ.Yr: 71 Publ.Type: OCEANOLOGY INTERNATIONAL, 6(12): 26-27, 30-32, DEC. 1971.
Descriptors: SURFACE DISTRIBUTION, MANGANESE NODULES, PHOTOMAPPING, PHOTOGRAPHY, COLUMBIA UNIV., LAMONT GEOLOGICAL OBSERV.

72-20273
WHAT RUSSIA KNOWS ABOUT PACIFIC MINERALS.
ANONYMOUS
Publ.Yr: 71 Publ.Type: OCEANOLOGY INTERNATIONAL, 6(12): 18-19, DEC. 1971.
Descriptors: MINING, MINERAL EXPLORATION, INDIAN OCEAN, MANGANESE NODULES, USSR, PACIFIC OCEAN

72-20049
WORLD-WIDE DISTRIBUTION OF MANGANESE NODULES.
HORN, D. R.; EWING, M.; HORN, B. M.; DELACH, M. N.
Publ.Yr: 72 Publ.Type: OCEAN INDUSTRY, 7(1): 26-29, JAN. 1972.
Descriptors: GLOBAL OCEAN DISTRIBUTION, OCEAN EXPLORATION, CORE SAMPLES, GEOLOGICAL DATA, OCEAN MINING, MANGANESE NODULES

71-60477
DEEPSEA VENTURES DEVELOPS PROCESS FOR SEPARATING NODULE METALS.
ANONYMOUS
Publ.Yr: 71 Publ.Type: UNDERSEA TECHNOLOGY, 12(6): 27, JUNE 1971.
Descriptors: MINERAL RECOVERIES, MANGANESE NODULES, DEEPSEA VENTURES, INC., NODULE PROCESSING

71-60468
MARINE MANGANESE NODULES STUDIED USING NUCLEAR REACTOR.
WIGGINS, PETER F.; DUFFY, DICK; EL KADY, AHMED
Publ.Yr: 71 Publ.Type: NAVAL ENGINEERS JOURNAL, 83(1): 31-34, FEB. 1971.
Descriptors: MANGANESE NODULES, NEUTRON ACTIVATION ANALYSIS, OCEAN FLOOR DEPOSITS, NUCLEAR REACTORS, NUCLEAR SPECTROSCOPY, OFFSHORE EXPLORATION

71-60392
DEEP OCEAN MINING - NEW APPLICATION FOR OIL FIELD AND MARINE EQUIPMENT.
LECOURT, EVERETT J., JR.; WILLIAMS, DARRELL W.
Publ.Yr: 71 Publ.Type: SEE CITATION NO. 71-4F-375 PP. 1859-1876. 1971.
Descriptors: OCEAN MINING, DREDGING EQUIPMENT, MANGANESE NODULES, R/V DEEPSEA MINER, PROTOTYPE

71-60391
CONTINUOUS BUCKET-LINE DREDGING AT 12,000 FEET.
MASUDA, YOSHIO; CRUICKSHANK, MICHAEL J.; MERO, JOHN L.
Publ.Type: SEE CITATION NO. 71-4F-375 PP. 1837-1858.
Descriptors: MANGANESE NODULES, OCEAN MINING, DREDGES OPERATIONS, CONTINUOUS BUCKET LINE TESTS, JAPAN

71-60385
OBSERVATIONS OF SAMPLING AND OCCURRENCE OF MANGANESE NODULES.
SCHATZ, CLIFFORD E.
Publ.Yr: 71 Publ.Type: SEE CITATION NO. 71-4F-375 PP. 1389-1396. 1971.
Descriptors: SAMPLING, MANGANESE NODULES, OFFSHORE EXPLORATION, MINERAL DEPOSITS

71-60373
TIMETABLE QUICKENS FOR MINING OCEAN NODULES.
GORDON, HENRY S.
Publ.Yr: 71 Publ.Type: CHEMICAL ENGINEERING, NEW YORK, 78(12): 34, MAY 31, 1971.
Descriptors: OCEAN MINING, MANGANESE NODULES, METALLURGY, DEEPSEA VENTURES, INC., PILOT PLANT, METALS RECOVERY

71-60370
PROCESS MAKES PURE METALS FROM OCEAN NODULES.
ANONYMOUS
Publ.Yr: 71 Publ.Type: CHEMICAL AND ENGINEERING NEWS, 49(19): 56-57, MAY 10, 1971.
Descriptors: MANGANESE NODULES, METALLURGY, MINERAL RECOVERIES, ION EXCHANGE, DEEPSEA VENTURES, INC., PILOT PLANT, HYDROMETALLURGICAL PROCESS

71-60330
DER ERSTE GROSSVERSUCH DES TIEFSEEBERGBAUS GELANG.
STEINERT, HARALD
Publ.Yr: 70 Publ.Type: ERDOEL-ERDGAS ZEITSCHRIFT, 86(11): 447-452, NOV. 1970.
Descriptors: OCEAN MINIMG, MANGANESE NODULES, MINERAL EXPLOITATION, INTERNATIONAL JOINT VENTURE

71-60185
RICH MANGANESE DEPOSIT DISCOVERED OFF HAWAII.
ANONYMOUS
Publ.Yr: 71 Publ.Type: OCEAN INDUSTRY, 6(3): 41, MARCH 1971.
Descriptors: OFFSHORE DISCOVERIES, HAWAII, MANGANESE NODULES

71-60025
DEEPSEA VENTURES' PILOT RUN IS SUCCESSFUL.
LA MOTTE, CLYDE
Publ.Yr: 70 Publ.Type: OCEAN INDUSTRY, 5(10) :7-9, 11, 13, OCT. 1970.
Descriptors: MANGANESE NODULES, OCEAN MINING, MINERAL DEPOSITS, DREDGES, DEEPSEA VENTURES, INC.

71-22163
THE DISTRIBUTION OF ORGANIC PIGMENTS IN MARINE MANGANESE NODULES FROM THE NORTHWEST INDIAN OCEAN.
GLASBY, G. P.; HODGSON, G. W.
Publ.Yr: 71 Publ.Type: GEOCHIMICA ET COSMOCHIMICA ACTA, 35(8): 845-851, AUG. 1971.
Descriptors: INDIAN OCEAN NORTH, MANGANESE NODULES, PIGMENTS, ORGANIC PIGMENTS, DISTRIBUTION

71-21988
LEAD ISOTOPES IN MARINE MANGANESE NODULES AND THE ORE-LEAD GROWTH CURVE.
REYNOLDS, PETER H.; DASCH, E. JULIUS
Publ.Yr: 71 Publ.Type: JOURNAL OF GEOPHYSICAL RESEARCH, 76(21): 5124-5129, JULY 20, 1971.
Descriptors: LEAD ISOTOPES, DEEP SEA SEDIMENTS, MANGANESE NODULES

71-21916
JEDWAB, JACQUES

71-21548
RATES OF ACCUMULATION OF MANGANESE NODULES AND ASSOCIATED SEDIMENT FROM THE EQUATORIAL PACIFIC.
SOMAYAJULU, B. L. K.; HEATH, G. R.; MOORE, T. C., JR.; CRONAN, D. S.
Publ.Yr: 71 Publ.Type: GEOCHIMICA ET COSMOCHIMICA ACTA, 35(6): 621-624, JUNE 1971.
Descriptors: MANGANESE NODULES, SEDIMENTS, PACIFIC OCEAN EQUATORIAL, ACCUMULATION RATE

71-21442
GEOCHEMISTRY OF MARINE PHOSPHATE AND MANGANESE DEPOSITS.
JOOMS, J. S.; SUMMERHAYES, C. P.; CRONAN, D. S.
Publ.Yr: 69 Publ.Type: SEE CITATION NO. 71-3B-1440 PP. 49-100. 1969.
Descriptors: OCEAN FLOOR DEPOSITS, MANGANESE NODULES, ABUNDANCE, GEOCHEMISTRY, PHOSPHATES, OCCURRENCE, MINERALOGY, MORPHOLOGY

71-21438
MINERALS FROM THE OCEANS - PART I.
PINGS, W. B.; PAIST, DONALD A.
Publ.Yr: 70 Publ.Type: COLORADO. SCHOOL OF MINES, GOLDEN. MINERAL INDUSTRIES BULLETIN, 13(22): 1-18, MARCH 1970.
Descriptors: BEACH DEPOSITS, MINERALS, SEAWATER CHEMISTRY, OCEAN FLOOR DEPOSITS, MAGNESIUM, SALT, BROMINE, HOT BRINE, MANGANESE NODULES

71-21407
MARIGENOUS MINERALS: WEALTH, REGIMES AND FACTORS OF DECISION.
CHRISTY, FRANCIS T., JR.
Publ.Yr: 70 Publ.Type: RESOURCES FOR THE FUTURE, INC. RFF REPORT NO. 87, 113-153, AUG. 1970.
Descriptors: OCEAN FLOOR DEPOSITS, MINERAL RESOURCES, MANGANESE NODULES, PHOSPHORITE

71-21301
AN EXAMINATION OF THE ELTANIN DREDGED ROCKS FROM THE SCOTIA SEA.
WATKINS, N. D.; SELF, R.
Publ.Yr: 71 Publ.Type: SEE CITATION NO. 71-3B-1289 PP. 327-343. 1971.
Descriptors: MANGANESE NODULES, SEDIMENTARY ROCKS, ROCKS, SCOTIA SEA, CLASSIFICATION, SAMPLE ANALYSIS

71-21210
THEORETICAL MODEL FOR MANGANESE DISTRIBUTION IN CALCAREOUS SEDIMENT CORES.
MICHARD, GIL
Publ.Yr: 71 Publ.Type: JOURNAL OF GEOPHYSICAL RESEARCH. 76(9): 2179-2186, MARCH 20, 1971.
Descriptors: CALCAREOUS SEDIMENT, MATHEMATICAL MODELS, MANGANESE NODULES, SEDIMENT CORES

71-20501
MORE NODULES.
ANONYMOUS
Publ.Yr: 71 Publ.Type: NATURE, 229(5287) :599, FEB. 26, 1971.
Descriptors: OCEAN FLOOR, HAWAII, NODULES, MANGANESE, KAUAI CHANNEL

71-20413
STUDY ON THE MANGANESE NODULE.
OKADA, AKIHIKO; SHIMA, MAKOTO
Publ.Yr: 70 Publ.Type: OCEANOGRAPHICAL SOCIETY OF JAPAN. JOURNAL, 26(3) :151-158, JUNE 1970.
Descriptors: MANGANESE NODULES, CHEMICAL AND X-RAY ANALYSES, TODOROKITE, MINERALS, PACIFIC OCEAN, OCEAN FLOOR

71-10016
BACTERIOLOGY OF MANGANESE NODULES. IV. INTRODUCTION OF AN MNO2 -- REDUCTASE SYSTEM IN A MARINE BACILLUS.
TRIMBLE, R. B.; EHRLICH, H. L.
Publ.Yr: 70 Publ.Type: APPLIED MICROBIOLOGY, 19(6) :966-972, JUNE 1970.
Descriptors: MICROORGANISMS, BACILLUS, MANGANESE OXIDE, ENZYMES, ATLANTIC OCEAN

70-03927
DEEP OCEAN NODULE MINING.
ROTHSTEIN, A. J.
Publ.Yr: 70 Publ.Type: UNDERWATER SCIENCE AND TECHNOLOGY. JOURNAL, 2(3) :133-137, SEPT. 1970.
Descriptors: DREDGING EQUIPMENT, JURISDICTION, MINERAL, MANGANESE NODULES, OFFSHORE EXPLOITATION, OCEAN MINING, DEEPSEA VENTURES INC., ECONOMICS

70-08891
OCEAN MINING: CONTINUOUS DREDGING.
ANONYMOUS
Publ.Yr: 70 Publ.Type: CHEMICAL AND ENGINEERING NEWS. 48(36) :13, AUG. 31, 1970.
Descriptors: OCEAN MINING, MANGANESE NODULES, DREDGES, NEWS, CONTINUOUS DREDGING TESTS, DEEP SEA

70-07208
RELATIONSHIP OF MORPHOLOGY AND TRANSITION METAL CONTENT OF MANGANESE NODULES TO AN ABYSSAL HILL.
HUBRED, GALE LEE
Publ.Yr: 70 Publ.Type: HAWAII. UNIVERSITY, HONOLULU. INSTITUTE OF GEOPHYSICS. REPORT NO. HIG-70-18, 38 PAGES, SEPT. 1970.
Descriptors: VOLCANISM, METAL CONTENT, MANGANESE NODULES, MORPHOLOGY, ABYSSAL HILLS

70-07097
RECENT DEVELOPMENTS IN DEEP OCEAN MINING.
KAUFMAN, RAYMOND; ROTHSTEIN, ARNOLD J.
Publ.Yr: 70 Publ.Type: SEE CITATION NO. 70-07095, PP. 935-961, 1970.
Descriptors: OCEAN MINING, MARKET POTENTIAL, OCEAN RESOURCES, MINING, MANGANESE NODULES

70-07093
THE NATIONAL INTEREST-A CASE STUDY OF CUPRO-NICKEL NODULES OF THE DEEP SEA.
SPRANGLER, MILLER B.
Publ.Yr: 70 Publ.Type: MARINE TECHNOLOGY 1970. VOL. I. CONFERENCE AND EXPOSITION. SIXTH ANNUAL. PREPRINTS. (HELD IN WASH., D.C., JUNE 29-JULY 1, 1970.) SPONSORED BY MARINE TECHNOLOGY SOCIETY. WASHINGTON, D.C., PP. 341-350, 1970.
Descriptors: NODULES, OCEAN MINING, MANGANESE NODULES, MINERAL RESOURCES, NICKEL ALLOYS

70-05675
NEW SLANT ON THE ECONOMY OF MANGANESE NODULES.
HUBRED, GALE L.
Publ.Yr: 70 Publ.Type: OCEAN INDUSTRY 5(8) : 26-27, AUG. 1970.
Descriptors: MANGANESE NODULES, ECONOMIC STUDIES, COBALT

70-05634
ACCUMULATION RATES OF MANGANESE IN PELAGIC SEDIMENTS AND NODULES.
BENDER, M. L. D. A.; TEH-LUNG, KU; BROECKER, W. S.
Publ.Yr: 70 Publ.Type: EARTH AND PLANETARY SCIENCE LETTERS 8(2) : 143-148, APRIL 1970.
Descriptors: MANGANESE, SEDIMENTS, DEEP SEA CORES

70-04102
THE TEXTURES AND MINERAL COMPOSITION OF IRON-MANGANESE CONCRETIONS FROM THE SOUTHERN PART OF THE PACIFIC OCEAN.
ANDRUSHCHENKO, P. F.; SKORNYAKOVA, N. S.
Publ.Yr: 69 Publ.Type: OCEANOLOGY 9(2) : 229-242, DEC. 1969.
Descriptors: PACIFIC OCEAN SOUTH, MANGANESE CONCRETIONS, MINERALOGY, IRON-MANGANESE NODULES

70-02819
RADIOCHEMICAL STUDIES ON MANGANESE NODULES OF DEEP-SEA ORIGIN.
TEH-LUNG-KU; BROECKER, WALLACE S.
Publ.Yr: 69 Publ.Type: DEEP-SEA RESEARCH AND OCEANOGRAPHIC ABSTRACTS , 16(6) 625-637, DEC. 1969.
Descriptors: ORIGIN, RADIO CHEMICAL STUDIES, OCEAN FLOOR, MANGANESE NODULES

70-02689
VISUAL OBSERVATIONS OF MANGANESE DEPOSITS ON THE BLAKE PLATEAU.
HAWKINS, LARRY K.
Publ.Yr: 69 Publ.Type: JOURNAL OF GEOPHYSICAL RESEARCH , 74(28) : 7009-7017, DEC. 20, 1969.
Descriptors: MANGANESE NODULES, BLAKE PLATEAU, SAND WAVES

70-02666
INTER-ELEMENT ASSOCIATIONS IN SOME PELAGIC DEPOSITS.
CRONAN, D.S.
Publ.Yr: 69 Publ.Type: CHEMICAL GEOLOGY , 5(2) : 99-106, NOV. 1969.
Descriptors: INDIAN OCEAN, PACIFIC OCEAN, GEOCHEMISTRY, PELAGIC SEDIMENTS, ELEMENTS ANALYSIS, MANGANESE NODULES

70-00567
INTERPRETATION OF THE MOSSBAUER SPECTRA OF MARINE IRON-MANGANESE NODULES.
HERZENBERG, C. L.; RILEY, D. L.
Publ.Yr: 69 Publ.Type: NATURE, 224(5216) :259-260, OCT. 18, 1969.
Descriptors: IRON-MANGANESE NODULES, NOTES, MOSSBAUER SPECTRA INTERPRETATION

69-08128
CHEMICAL AND MINERALOGICAL VARIATIONS WITH DEPTH IN MANGANESE NODULES.
CRONAN, D. S.
Publ.Yr: 69 Publ.Type: AMERICAN GEOPHYSICAL UNION, FIFTIETH ANNUAL MEETING, ABSTRACTS, HELD IN WASH., D.C., APRIL 21-25,1969. IN- AMERICAN GEOPHYSICAL UNION, TRANSACTIONS, VOL. 50, NO. 4, P.209, APRIL 1969. ABS. ONLY.
Descriptors: MANGANESE NODULES, CHEMICAL ANALYSIS, MINERALS, TODORO KITE, MANGANESE OXIDE, DEPTHS

69-07382
OFFSHORE MINING SYSTEM UNVEILED AT OTC MEETING.
NIBLOCK, ROBERT W.
Publ.Yr: 69 Publ.Type: UNDERSEA TECHNOLOGY, VOL. 10, NO. 6, P.22-25, JUNE 1969. NO ABS., 4 FIGS., NO REFS.
Descriptors: DREDGES, DEEP SEA, MANGANESE NODULES, DEEPSEA VENTURES, MINING

69-06283
AN ENGINEERING APPROACH TO OCEAN MINING.
FLIPSE, JOHN E.
Publ.Yr: 69 Publ.Type: OFFSHORE TECHNOLOGY CONFERENCE, FIRST ANNUAL, VOL. I, PREPRINTS, HELD IN HOUSTON, TEX., MAY 18-21,1969. SPONSORED BY NINE ORGANIZATIONS, P.317-332, 1969. ABS., 10 FIGS., 1 TABLE, 14 REFS., *AA.
Descriptors: MANGANESE NODULES, DREDGES, OCEAN MINING, MINING , MINERAL EXPLOITATION

69-06279
NODULAR RICHES ON THE OCEAN FLOOR.
KRAFT, LOUIS
Publ.Yr: 69 Publ.Type: S.A. MINING AND ENGINEERING JOURNAL, VOL. 80, NO. 3975, P.815-816,818, APRIL 11,1969. NO ABS., 3 FIGS., NO REFS.
Descriptors: OCEAN MINING, MINERAL DEPOSITS, MANGANESE NODULES

69-05734
IRON-MANGANESE NODULES FROM THE CENTRAL PART OF THE SOUTH PACIFIC.
SKORNYAKOVA, N. S.; ANDRUSHCHENKO, P. F.
Publ.Yr: 69 Publ.Type: OCEANOLOGY, VOL. 8, NO. 5, P.692-701, MAY 1969. TRANS. OF OKEANOLOGIIA, VOL. 8, NO. 5, 1968, AMERICAN GEOPHYSICAL UNION. ABS., 5 FIGS., 6 TABLES, 17 REFS., 1 IN RUSS.
Descriptors: CHEMICAL COMPOSITION, IRON-MANGANESE NODULES, DISTRIBUTION, PACIFIC OCEAN SOUTH

69-04017
SIMPLE NODULE ANALYSIS.
ANONYMOUS
Publ.Yr: 69 Publ.Type: OCEANOLOGY INTERNATIONAL, VOL. 4, NO. 2, P.15, MARCH/ APRIL 1969.
Descriptors: WESTINGHOUSE ASTRONUCLEAR LAB., MANGANESE NODULES, NONDESTRUCTIVE ANALYSIS, INDUSTRY BRIEF

69-03246
VISUAL OBSERVATIONS OF MANGANESE DEPOSITS ON THE BLAKE PLATEAU.
HAWKINS, LARRY K.
Publ.Yr: 68 Publ.Type: US NAVAL OCEANOGRAPHIC OFFICE. WASH., D.C., INFORMAL REPORT NO. IR 68-99, 22 PAGES, NOV.1968. ABS., 10 FIGS., 6 REFS., AA.
Descriptors: BLAKE PLATEAU, SAND WAVES, MANGANESE NODULES

69-00605
MOSSBAUER SPECTRA OF DEEP-SEA IRON-MANGANESE NODULES.
GAGER, H. M.
Publ.Yr: 68 Publ.Type: NATURE, VOL. 220, NO. 5171, P.1021-1023, DEC.7,1968. NO ABS., 1 FIG., 5 TABLES, 12 REFS.
Descriptors: CHEMICAL ANALYSIS, IRON-MANGANESE NODULES, NICKEL, DEEP SEA, COBALT, SEDIMENTS, MOSSBAUER SPECTRA, SPECTROSCOPY

69-00564
OCEAN BOTTOM PHOTOGRAPHS IN THE AREA OF THE OLDEST KNOWN OUTCROPS, NORTH ATLANTIC OCEAN.
EWING, MAURICE; MOUZO, FELIX
Publ.Yr: 68 Publ.Type: NATIONAL ACADEMY OF SCIENCES. PROCEEDINGS, VOL. 61, NO. 3, P.787-793, NOV.1968. SUM., 5 FIGS., 1 TABLE, 9 REFS. CONTRACT- ONR N000014-67-A-0108-004. ALSO IN- CONTRIBUTIO NO. 1255 FROM LAMONT GEOLOGICAL OBSERV.
Descriptors: JOIDES, PHOTOGRAPHY, BOTTOM CURRENTS, OCEAN FLOOR TOPOGRAPHY, OUTCROPS, MANGANESE NODULES

68-08496
IRON-MANGANESE NODULES FROM NARES ABYSSAL PLAIN- GEOCHEMISTRY AND MINERALOGY.
SMITH, R. E.; GASSAWAY, J. D.; GILES, H. N.
Publ.Yr: 68 Publ.Type: SCIENCE, VOL. 161, NO. 3843, P.780-781, AUG.23,1968. ABS., 2 TABLES, 13 REFS.
Descriptors: SEDIMENTATION, GEOCHEMISTRY, ABYSSAL PLAINS, VOLCANOES, IRON-MANGANESE NODULULES

68-07393
THORIUM, RADIUM AND POTASSIUM IN MANGANESE NODULES.
BUCHOWIECKI, J.; CHERRY, R. D.
Publ.Yr: 68 Publ.Type: CHEMICAL GEOLOGY, VOL. 3, NO. 2, P.111-117, JUNE 1968. IN ENGLISH, SUM., 1 FIG., 2 TABLES, 18 REFS. 1 IN GER., AS.
Descriptors: THORIUM, RADIUM, POTASSIUM

68-07390
TODOROKITE IN MANGANESE NODULES FROM A BRITISH COLUMBIA FJORD.
GRILL, E. V.; MURRAY, J. W.; MACDONALD, R. D.
Publ.Yr: 68 Publ.Type: NATURE, VOL. 219, NO. 5152, P.358-359, JULY 27,1968. NO ABS., 1 FIG., 2 TABLES, 5 REFS.
Descriptors: CANADA WEST COAST, TODOROKITE, MANGANESE NODULES, CHEMICAL COMPOSITION

68-07389
MERCURY CONTENT OF DEEP-SEA MANGANESE NODULES.
HARRISS, ROBERT C.
Publ.Yr: 68 Publ.Type: NATURE, VOL. 219, NO. 5149, P.54-55, JULY 6,1968. NO ABS., 1 TABLE, 8 REFS.
Descriptors: MANGANESE NODULES, HEAVY METALS, MERCURY

68-06224
GEOCHRONOLOGICAL INVESTIGATIONS OF THE SOUTHERN PACIFIC.
HOLMES, C. W.; GOODELL, H. G.; OSMOND, J. K.
Publ.Yr: 67 Publ.Type: FLORIDA. STATE UNIVERSITY, TALLAHASSEE. SEDIMENTOLOGICAL RESEARCH LABORATORY. CONTRIBUTION NO. 21, 21 PAGES, AUG. 1967. SUM., 9 FIGS., 6 TABLES, 1 APPENDIX, 19 REFS. GRANT- NSF GA-246, REF. ORDER NO. PB 177 288.
Descriptors: CORES, MANGANESE NODULES, GEOCHRONOLOGY, SILICEOUS CORES, CARBONATE CONTENT, PACIFIC OCEAN SOUTH

68-06196
A MICROSCOPIC AND ELECTRON PROBE INVESTIGATION OF MANGANESE NODULES FROM THE NORTHWEST INDIAN OCEAN.
CRONAN, D. S.; TOOMS, J. S.
Publ.Yr: 68 Publ.Type: DEEP-SEA RESEARCH AND OCEANOGRAPHIC ABSTRACTS, VOL. 15, NO. 2, P.215-223, APRIL 1968. ABS., 9 PLATES, 1 TABLE, 15 REFS.
Descriptors: MANGANESE NODULES, NODULES, INDIAN OCEAN WEST

68-05880
BACTERIOLOGY OF MANGANESE NODULES. III. REDUCTION OF MANGANESE OXIDE BY TWO STRAINS OF NODULE BACTERIA.
TRIMBLE, R. B.; EHRLICH, H. L.
Publ.Yr: 68 Publ.Type: APPLIED MICROBIOLOGY, VOL. 16, NO. 5, P.695-702, MAY 1968. ABS., 2 FIGS., 2 TABLES, 14 REFS. CONTRACT- ONR 591.22, NR 103-665.
Descriptors: MANGANESE NODULES, BACTERIA, MANGANESE OXIDES

68-05211
MANGANESE NODULES FROM THE SOUTH-WESTERN PACIFIC.
SUMMERHAYES, C. P.
Publ.Yr: 67 Publ.Type: NEW ZEALAND JOURNAL OF GEOLOGY AND GEOPHYSICS, VOL. 10, NO. 6, P.1372-1381, DEC.1967. ABS., 4 FIGS., 3 TABLES, 18 REFS. 1 IN GER., 1 IN RUSS., AA. ALSO IN- CONTRIBUTION NO. 202 FROM NEW ZEALAND OCEANOGRAPHIC INST.
Descriptors: NODULES, MANGANESE NODULES, PACIFIC ISLANDS

68-04630
THE DISTRIBUTION OF MANGANESE NODULES IN THE NORTH PACIFIC.
EWING, M.; SOKOLSKY, G.; AITKEN, T.
Publ.Yr: 68 Publ.Type: AMERICAN GEOPHYSICAL UNION. FORTY-NINTH ANNUAL MEETING. HELD IN WASH., D.C. APRIL 8-11,1968, PROGRAM AND ABSTRACTS. IN- AMERICAN GEOPHYSICAL UNION. TRANSACTIONS, VOL. 49, NO. 1, P.57-376, MARCH 1968. P.223.
Descriptors: MANGANESE NODULES, PACIFIC OCEAN NORTH

68-04221
PHYSIOGRAPHY AND BOTTOM CURRENTS IN THE BELLINGSHAUSEN SEA.
HEEZEN, BRUCE C.; HOLLISTER, CHARLES D.
Publ.Yr: 67 Publ.Type: ANTARCTIC JOURNAL OF THE UNITED STATES, VOL. 2, NO. 5, P.184-185, SEPT.-OCT.1967. NO ABS., 2 FIGS., NO REFS.
Descriptors: MANGANESE NODULES, BELLINGSHAUSEN SEA, ELTANIN, PHOTO INTERPRETATIONS

68-03935
SURFACE SEDIMENTS OF DRAKE PASSAGE.
KOLPACK, RONALD L.
Publ.Yr: 67 Publ.Type: ANTARCTIC JOURNAL OF THE UNITED STATES, VOL. 2, NO. 5, P.183, SEPT.-OCT.1967. NO ABS., NO REFS.
Descriptors: SEDIMENT TRANSPORT, CARBONATES, MANGANESE NODULES, SEDIMENTS, CIRCULATION, DRAKE PASSAGE, ICE RAFTING

68-03903
SOME GEOCHEMICAL OBSERVATIONS ON MANGANESE-IRON OXIDE NODULES FROM DIFFERENT DEPTH ENVIRONMENTS.
PRICE, N. B.
Publ.Yr: 67 Publ.Type: MARINE GEOLOGY, VOL. 5, NO. 5/6, P.511-538, OCT.1967. IN ENGLISH, SUM., 3 FIGS., 5 TABLES, NUMEROUS REFS., AS.
Descriptors: DEPTHS, MANGANESE-IRON OXIDE, NODULES

68-02820
THE EVOLUTION OF A MANGANESE NODULE.
BROECKER, WALLACE S.; BENDER, MICHAEL; TEH LUNG KU
Publ.Yr: 66 Publ.Type: INTERNATIONAL OCEANIC CONGRESS. 2ND. USSR ACADEMY OF SCIENCES, ABSTRACTS OF PAPERS. HELD IN MOSCOW, MAY 30- JUNE 9,1966. P.64-65, 1966.
Descriptors: SEDIMENTATION, AUTHIGENIC MANGENESE, MANGANESE NODULES

68-01974
FURTHER OBSERVATIONS ON THE COMPOSITION OF MANGANESE NODULES, WITH PARTICULAR REFERENCE TO SOME OF THE RARER ELEMENTS.
AHRENS, L. H.; WILLIS, J. P.; DOSTUIZEN, C. O.
Publ.Yr: 67 Publ.Type: GEOCHIMICA ET COSMOCHIMICA ACTA, VOL. 31, NO. 11, P.2169- 2180, NOV.1967. ABS., 7 FIGS., 5 TABLES, 17 REFS., AA.
Descriptors: RARE ELEMENTS, MANGANESE NODULES

68-01961
MANGANESE AND RELATED ELEMENTS IN THE INTERSTITIAL WATER OF MARINE SEDIMENTS.
PRESLEY, B. J.; BROOKS, R. R.; KAPLAN, I. R.
Publ.Yr: 67 Publ.Type: SCIENCE, VOL. 158, NO. 3803, P.906-910, NOV.17.1967. ABS., 1 FIG., 2 TABLES, 17 REFS., AA. GRANT- U.S. AEC AT, 11-1-34-PA134. ALSO IN- CONTRIBUTION NO. 619 FROM UNIV. OF CALIF., INST. OF GEOPHYSICS AND PLANETARY PHYSICS, LOS ANGELES.
Descriptors: TRACE ELEMENTS, CALIFORNIA COAST, SEDIMENTS, CORES, EAST PACIFIC RISE, INTERSTITIAL WATER, MANGANESE NODULES

68-01107
MINERALOGY OF MANGANESE NODULES FROM THE SOUTHERN OCEANS.
MEYLAN, M.; GOODELL, H. G.
Publ.Yr: 67 Publ.Type: GEOLOGICAL SOCIETY OF AMERICA AND ASSOCIATED SOCIETIES ANNUAL MEETINGS. 1967. GEOLOGICAL SOCIETY OF AMERICA. HELD IN NEW ORLEANS, LA., NOV.20-22,1967. PROGRAM AND ABSTRACTS. P.149.
Descriptors: SOUTHERN OCEAN, MANGANESE NODULES

67-04689
MANGANESE NODULES- NATURE AND SIGNIFICANCE OF INTERNAL STRUCTURE.
SOREM, RONALD K.
Publ.Yr: 67 Publ.Type: ECONOMIC GEOLOGY AND B.S.E.G. VOL. 62, NO. 1, JAN.- FEB.1967. P.141-147, NO ABS., FIGS., 8 REFS.
Descriptors: MANGANESE NODULES, INTERNAL STRUCTURE, NODULE FORMATION

67-04368
CARBONATE LITHIFICATION ON THE SEA FLOOR.
FISCHER, ALFRED G.; GARRISON, ROBERT E.
Publ.Yr: 67 Publ.Type: JOURNAL OF GEOLOGY, VOL. 75, NO. 4, JULY 1967. P.488-496, ABS., 1 FIG., 4 PLATES, 21 REFS., MF, AA.
Descriptors: LITHIFICATION, CALCITE PRECIPITATION, CARBONATE SEDIMENT

INDURATED GLOBIGERINA-RICH SEDIMENTS HAVE BEEN RECORDED FROM MORE THAN THIRTY LOCALITIES ON SEA FLOORS AROUND THE WORLD, BETWEEN DEPTHS OF 200 AND 3,500 M. MANY ARE STAINED BY IRON AND MANGANESE MINERALS OR ARE ASSOCIATED WITH MANGANESE NODULES OR CRUSTS, SUGGESTING THAT SUCH LITHIFICATION OCCURS ALONG PROFILES OF SEDIMENTATIONAL EQUILIBRIUM. SAMPLES FROM THE EASTERN MEDITERRANEAN AND FROM OFF BARBADOS, HERE DESCRIBED AND ILLUSTRATED WITH PHOTOMICROGRAPHS AND ELECTRON MICROGRAPHS, CONTAIN HIGH- MAGNESIAN CALCITE AND DOLOMITE, AND SHOW RECRYSTALLIZATION OF THE MICRITIC MATRIX, AS WELL AS CALCITIC CAVITY FILLINGS. WE CONCLUDE, CONTRARY TO WIDESPREAD OPINION, THAT CALCITE CAN BE PRECIPITATED CHEMICALLY IN SEAWATER, AND THAT CARBONATE SEDIMENTS CAN BECOME LITHIFIED ON THE SEA FLOOR. A.A.

67-03995
POTASSIUM-ARGON GEOCHRONOLOGY OF DEEP-SEA SEDIMENTARY MATERIALS.
DYMOND, JACK ROLAND
Publ.Yr: 66 Publ.Type: POTASSIUM-ARGON GEOCHRONOLOGY OF DEEP-SEA SEDIMENTARY MATERIALS. DYMOND, JACK ROLAND. UNIVERSITY OF CALIF., SAN DIEGO. DISSERTATION. 1966. ALSO AS- CALIFORNIA. UNIVERSITY. DEPT. OF OCEANOGRAPHY. SAN DIEGO, CALIF. DISSERTATION. 1966. 67 PAGES, ABS., FIGS., TABLES. 59 REFS., MF, AA. GRANT. NSF GP-489. CONTRACT. AEC AT.11-1,34.
Descriptors: SEDIMENT, PELAGIC SEDIMENT, DISSERTATION, POTASSIUM ARGON, GEOCHRONOLOGY, AGE DETERMINATION

ALTHOUGH RADIOMETRIC DATING OF DEEP-SEA SEDIMENTS HAS PROVIDED SOME UNDERSTANDING OF TIME RELATIONSHIPS IN SEDIMENTS YOUNGER THAN 500,000 YEARS, NEW METHODS ARE REQUIRED FOR MORE ANCIENT SEDIMENTS. THE PURPOSE OF THIS STUDY IS TO TEST THE FEASIBILITY OF USING POTASSIUM-ARGON AGES OF RAPIDLY DEPOSITED VOLCANIC PHASES AS A MEASURE OF THE TIME OF DEPOSITION OF PELAGIC SEDIMENTS. A POTASSIUM- ARGON DATING METHOD APPLICABLE TO SMALL QUANTITIES OF VOLCANIC MINERALS AND GLASS HAS BEEN DEVELOPED AND APPLIED TO DATABLE PHASES SEPARATED FROM DEEP-SEA CORES AND MANGANESE NODULES. A HIGHLY SENSITIVE OMEGATRON MASS SPECTROMETER WAS USED TO ANALYZE FOR ARGON, AND POTASSIUM ANALYSES WERE MADE WITH AN ATOMIC ABSORPTION SPECTROPHOTOMETER. CONCORDANT AGES ON DIFFERENT MINERALS FROM THE SAME CORE LEVEL AND THE RELATIVELY GOOD AGREEMENT WITH PALEONTOLOGIC EVIDENCE, SUGGEST THAT THE TRUE TIME OF DEPOSITION IS BEING MEASURED. VOLCANIC MINERALS, FELDSPAR, AMPHIBOLE, AND BIOTITE, SEPARATED FROM TWO RED CLAY CORES FROM THE NORTH CENTRAL PACIFIC HAVE MIDDLE TERTIARY AGES. THE SEDIMENTATION RATES FOR THE DATED INTERVAL IN THESE CORES RANGED FROM 0.4 TO 0.7 MM/10 TO THE THIRD POWER YEARS. ACIDIC GLASS, SEPARATED FROM THE EXPERIMENTAL MOHOLE CORE AND FIVE OTHER EASTERN PACIFIC CORES, WERE DATED BY K-AR. THE RESULTS ON MOHOLE CORE ARE COMPATIBLE WITH PALEONTOLOGIC EVIDENCE. THE DATA ON THE OTHER FIVE SUGGEST THAT THE ASH LAYERS IN THREE OF THE CORES ORIGINATED FROM THE SAME VOLCANIC EVENT. AGES FROM THE VOLCANIC NUCLEI OF TWO MANGANESE NODULES PERMIT AVERAGE RATES OF MANGANESE ACCUMULATION TO BE CALCULATED. THESE RATES RANGE FROM 0.5 TO 6.0 MM/10 TO THE SIXTH POWER YEARS. THE AUTHIGENIC MINERAL, PHILLIPSITE, SEPARATED FROM DEEP-SEA CORES DOES CONTAIN RADIOGENIC ARGON. PHILLIPSITE AGES ARE APPROXIMATELY 75% LOWER THAN THE AGES OF COEXISTING VOLCANIC MINERALS, FOR REASONS STILL UNCERTAIN. A.A.

67-03885
NEW CONCEPT FOR LIFTING NODULES.
BALL, JAMES
Publ.Yr: 67 Publ.Type: OCEAN INDUSTRY. VOL. 2, NO. 6, JUNE 1967. P.37-39, NO ABS., FIGS., 3 REFS.
Descriptors: MINING SYSTEMS, MINING TECHNOLOGY, MANGANESE NODULES

67-03842
USE OF DEEP-SEA NODULES FOR REMOVING SULFUR COMPOUNDS FROM GASES.
ZIMMERLEY, STUART R.
Publ.Yr: 67 Publ.Type: OFFICIAL GAZETTE. UNITED STATES PATENT OFFICE. VOL. 840, NO. 2, JULY 11,1967. P.426 FILED FEB.19,1965. SER. NO. 433,953. 18 CLAIMS. CL. 55-73, MF.
Descriptors: MANGANESE NODULES, PATENT, SULFUR REMOVAL

67-03506
BERYLLIUM-20 IN A MANGANESE NODULE.
SOMAYAJULU, B. L. K.
Publ.Yr: 67 Publ.Type: SCIENCE. VOL. 156, NO. 3779, JUNE 2,1967. P.1219-1220. ABS., TABLE, 12 REFS., MF, AA.
Descriptors: BERYLLIUM-10, GEOCHEMISTRY, MANGANESE NODULES

ANALYSES OF BERYLLIUM-10 ACTIVITY IN TWO SECTIONS OF A MANGANESE NODULE INDICATE AN ACCUMULATION RATE THAT COMPARES WELL WITH SUCH RATES MEASURED BY OTHER METHODS ON DIFFERENT NODULES. THE OBSERVED SPECIFIC ACTIVITY OF BERRYLLIUM-10 IN THE NODULE IS IN ACCORD WITH THE CALCULATIONS BASED ON THE PRODUCTION OF BERYLLIUM-10 BY COSMIC RAYS IN THE ATMOSPHERE AND WITH THE GEOCHEMISTRY OF BERYLLIUM IN THE OCEAN. A.A.

67-03110
COREHEAD CAMERA FOR MEASUREMENT OF CURRENTS AND CORE ORIENTATION.
EWING, MAURICE; HAYES, DENNIS E.; THORNDIKE, E. M.
Publ.Yr: 67 Publ.Type: DEEP-SEA RESEARCH AND OCEANOGRAPHIC ABSTRACTS. VOL. 14, NO. 2, APRIL 1967. P.253-258. ABS., FIGS., 6 PLATES, SUM., 9 REFS., MF, AA.
Descriptors: TRANSIENT BOTTOM EFFECTS, CENTRAL NORTH PACIFIC OCEAN, CORE ORIENTATION, COREHEAD CAMERA, CURRENT MEASUREMENT, BOTTOM CURRENTS, CAMERAS

THE COREHEAD CAMERA IS AN INSTRUMENT DESIGNED FOR USE WITH THE PISTON CORING APPARATUS. IT HAS BEEN USED FOR DETERMINING THE DIRECTION AND STRENGTH OF THE BOTTOM CURRENTS AND FOR CORE ORIENTATION. RESULTS FROM THE CENTRAL NORTH PACIFIC INDICATE THAT BOTTOM CURRENT VELOCITIES ARE OF THE ORDER OF 1-2 CM/SEC. MANGANESE NODULES WERE PHOTOGRAPHE ON THE BOTTOM AND HAVE BEEN DISTURBED BY THE CORING OPERATION. OTHER TRANSIENT BOTTOM EFFECTS CAN BE MONITORED. A.A.

67-03108
GEOCHEMISTRY OF MANGANESE NODULES FROM THE N.W. INDIAN OCEAN.
CRONAN, D. S.; TOOMS, J. S.
Publ.Yr: 67 Publ.Type: DEEP-SEA RESEARCH AND OCEANOGRAPHIC ABSTRACTS. VOL. 14, NO. 2, APRIL 1967. P.239-249. ABS., FIGS., TABLES 1 FOLD. 15 REFS., MF, AA.
Descriptors: NODULE GENESIS, NODULES, NORTHWEST INDIAN OCEAN, MANGANESE NODULES, GEOCHEMISTRY

MANGANESE NODULES COLLECTED FROM FOUR SITES IN THE N.W. INDIAN OCEAN BY R.R.S. DISCOVERY HAVE BEEN ANALYZED FOR A RANGE OF ELEMENTS. AT TWO OF THE SITES, SAMPLES WERE COLLECTED FROM TWO MORPHOLOGICAL POPULATIONS. AT ONE OF THESE SITES EACH POPULATION BEING A DISTINCT CHEMICAL POPULATION ALSO. IN ADDITION, CONSIDERABLE DIFFERENCES HAVE BEEN OBSERVED IN THE COMPOSITION OF MORPHOLOGICALLY SIMILAR NODULES FROM SITES A FEW MILES APART. THE INFORMATION OBTAINED IS OF SIGNIGICANCE IN ANY CONSIDERATION OF THE GENESIS OF THE NODULES AND COULD HAVE PRACTICAL IMPLICATIONS IN THE EVENT THAT MANGANESE NODULES BECOME A POTENTIAL SOURCE OF MANGANESE AND OTHER METALLIC ELEMENTS. A.A.

67-02350
WHATS IN THE OCEAN.
MACDONALD, GORDON J. F.
Publ.Yr: 67 Publ.Type: INTERNATIONAL SCIENCE AND TECHNOLOGY. NO. 64, APRIL 1967. P.38-48, NO ABS., FIGS., NO REFS., MF.
Descriptors: LAW OF THE SEA, NODULES, MANGANESE NODULES, MILITARY, MINERALS, PROGRAMS, RESOURCES, ECONOMICS, FISHERIES

67-02089
SUBSURFACE CONCENTRATIONS OF MANGANESE NODULES IN PACIFIC SEDIMENTS.
CRONAN, D. S.; TOOMS, J. S.
Publ.Yr: 67 Publ.Type: DEEP-SEA RESEARCH AND OCEANOGRAPHIC ABSTRACTS. VOL. 14, NO. 1, FEB.1967. P.117-119, ABS., FIGS., TABLES, 8 REFS., MF.
Descriptors: NODULE DISTRIBUTION, MANGANESE NODULES, PACIFIC OCEAN, SEDIMENT CORES, MANGANESE NODULE DISTRIBUTION

67-01979
REACTIONS WITH MANGANESE BY BACTERIA FROM MARINE FERROMANGANESE NODULES.
EHRLICH, H. L.
Publ.Yr: 66 Publ.Type: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY. VOL. 7, 1966. P.279-286, ABS., 2 FIGS., 4 TABLES, 3 REFS., MF, AA. CONTRACT- ONR NONR 591,22, NR 103655/9-23-64.
Descriptors: FERROMANGANESE NODULES, BACTERIA, NODULES, MANGANESE

PREVIOUS REPORTS BY THE AUTHOR REVEALED AN INTIMATE ASSOCIATION OF SEVERAL BACTERIAL SPECIES WITH MANGANESE NODULES FROM THE ATLANTIC OCEAN. IT WAS DEMONSTRATED BY SELECTIVE ENRICHMENT AND WITH PURE-CULTURE ISOLATES THAT SOME OF THE BACTERIA FROM NODULES CAN ACCELERATE ACCRETION OF DISSOLVED MANGANESE TO NODULES, AND OTHERS CAN PROMOTE RELEASE OF MANGANESE FROM THESE CONCRETIONS. BOTH PROCESSES OCCUR UNDER AEROBIC CONDITIONS. RECENT WORK STRONGLY INDICATES THAT THE BACTERIAL CONTRIBUTION IN MANGANESE- ACCRETION TO AND MANGANESE-RELEASE FROM NODULES IS ENZYMATIC ACTION ON MANGANESE. IN MANGANESE-ACCRETION, BACTERIA REACT WITH MANGANOUS MANGANESE, AFTER IT HAS FIRST BEEN ADSORBED TO NODULE SURFACES. THIS IS INFERRED BECAUSE IN 3-HOUR EXPERIMENTS, MORE MANGANESE IS PICKED UP BY A SYNTHETIC MN, FE OXIDE PREPARATION IN THE PRESENCE OF BACTERIA THAN IN THEIR ABSENCE. UNADSORBED, SEE EQUATION, IS NOT ACTED UPON BY THE BACTERIA. THE BACTERIAL ACTION REQUIRES PEPTONE AND SOME OF THE IONS OF SEA WATER. HEAT-KILLED OR HGCL2- POISONED CELLS ARE INACTIVE. IN MANGANESE RELEASE, BACTERIA CATALYZE A TWO-STEP REDUCTION OF MNO2 IN WHICH GLUCOSE CAN ACT AS REDUCTANT. THIS IS INFERRED BECAUSE, IN 3-HOUR EXPERIMENTS, MEASURABLE AMOUNTS OF, SEE EQUATION, ARE RELEASED BY THE BACTERIA FROM MNO2. FERRICYANIDE OR FERROCYANIDE ARE REQUIRED FOR ELECTRON TRANSFER BY CELLS THAT HAVE BEEN GROWN IN THE ABSENCE OF MNO2. THESE COMPOUNDS REPLACE AN ADAPTIVE ENZYME OR ENZYME SYSTEM. HEAT-KILLED AND HGCL2-POISONED CELLS ARE INACTIVE. SOME OF THE IONS IN SEA WATER ARE ESSENTIAL FOR OPTIMAL ACTIVITY. THE FINDINGS INDICATE THAT A MICROBIALLY MEDIATED MANGANESE CYCLE CAN OCCUR IN THE OCEANS. A.A.

67-01612
ARAGONITE VEIN FILLINGS IN MARINE MANGANESE NODULES.
MCFARLIN, PETER F.
Publ.Yr: 67 Publ.Type: JOURNAL OF SEDIMENTARY PETROLOGY. VOL. 37, NO. 1, MARCH 1967. P.68-72, ABS., FIGS., TABLES, 24 REFS., MF, AA. ALSO IN- COLLECTED REPRINTS, 196 CONTRIBUTION NO. 1809, FROM WOODS HOLE OCEANOGRAPHIC INSTITUTION.
Descriptors: ARAGONITE, NODULES, MANGANESE

CARBONATE VEINS IN MARINE MANGANESE OXIDES FROM THE BLAKE PLATEAU CONTAIN WELL-CRYSTALLIZED ARAGONITE IN STELLATE GROUPS AND NEEDLES UP TO 3 MM LONG. OXYGEN ISOTOPE ANALYSES SUGGEST THAT THE ARAGONITE FORMED AT A TEMPERATURE 4 DEGREES TO 6 DEGREES C. COLDER THAN PRESENT SEDIMENT TEMPERATURE OF 8 DEGREES TO 9 DEGREES C. THE MORPHOLOGY OF THE ARAGONITE, ITS COMPLETE ENCLOSURE IN MANGANESE NODULES AND THE APPARENT 600 TO 800 M WATER DEPTH THAT PREVAILED THROUGHOUT THE GROWTH OF THE NODULE AND VEINS, STRONGLY SUGGEST THAT THE ARAGONITE IS OF INORGANIC ORIGIN. CALCITES WITH SMALLER THAN NORMAL CELL DIMENSIONS OCCUR IN SOME OF THE CARBONATE VEINS AND MAY BE DUE TO THE SUBSTITUTION OF IRON OR MANGNAESE RATHER THAN MAGNESIUM IONS IN THE CALCITE STRUCTURE. A.A.

67-01269
MANGANESE NODULES, TOPOGRAPHY AND THICKNESS OF QUATERNARY SEDIMENTS IN THE CENTRAL PACIFIC.
HEATH, G. R.; MOORE, T. C., JR.
Publ.Yr: 66 Publ.Type: NATURE. VOL. 212, NO. 5066, DEC.3,1966. P.983-985, NO ABS., 2 FIGS., 1 TABLE, 14 REFS., MF.
Descriptors: MANGANESE NODULES, MS 021, QUATERNARY, THICKNESS, SEDIMENT, TOPOGRAPHY, CENTRAL PACIFIC OCEAN, CORES

67-00365
MANGANESE NODULES- THORIUM-230- PROTACTINIUM-231 RATIOS.
SACKETT, WILLIAM M.
Publ.Yr: 66 Publ.Type: SCIENCE. VOL. 154, NO. 3749, NOV.4,1966. P.646-647 ABS., 1 TABLE, 9 REFS. CONTRACT- AEC AT,11-1, 1540.
Descriptors: THORIUM-230/PROTACTINIUM-231, CHEMICAL ANALYSIS, URANIUM CONTENT, MANGANESE NODULES, SEDIMENT

67-00145
THE OCEANS- TECHNOLOGYS NEW CHALLENGE.
MCILHENNY, W. F.
Publ.Yr: 66 Publ.Type: CHEMICAL ENGINEERING. NOV.7,1966. P.247-254 NO ABS., 5 FIGS., 2 TABLES, 24 REFS. SEE ALSO- OI ACCESSION NO. 67- 67.
Descriptors: ENGINEERING, FISHERIES, INDUSTRY, HEAVY MINERALS, CONTINENTAL SHELF, TIN, EXPLOITATION, SULFUR, PETROLEUM, CHEMICALS, COMMERCE, DIAMOND, SHELLS, MANGANESE NODULES, MINING

67-00036
THE EXPLORATION FOR AND PRODUCTION OF SOLID MINERALS FROM THE OFFSHORE AREA.
MERO, JOHN L.
Publ.Yr: 66 Publ.Type: OECON, OFFSHORE EXPLORATION CONFERENCE 1966. PROCEEDINGS. HELD AT LONG BEACH, CALIFORNIA, M.J. RICHARDSON INC., 2516 VIA TEJON, PALOS VERDES ESTATES, CALIFORNIA. 1966. P.735-760 NO ABS., 9 FIGS., 5 TABLES, 8 REFS.
Descriptors: OFFSHORE, MINERALS, PRODUCTION, PHOSPHORITE, PLACERS, EXPLOITATION, EXPLORATION, MANGANESE NODULES, MINING, CONTINENTAL SHELF

66-04183
THE MANIHIKI PLATEAU.
HEEZEN, BRUCE C.; GLASS, BILL; MENARD, H. W.
Publ.Yr: 66 Publ.Type: DEEP-SEA RESEARCH AND OCEANOGRAPHIC ABSTRACTS. VOL. 13, NO. 3, JUNE 1966. P.445-458, PLUS 6 PLATES, ABS., 12 FIGS., 3 TABLES, 13 REFS. ALSO IN- CONTRIBUTION NO. 884 FROM GEOL. OBSERV., PALISADES, N.Y.
Descriptors: BOTTOM CURRENTS, STRUCTURE, BATHYMETRIC CHART, GEOLOGY, CURRENTS, FORAMINIFERA, PETROLOGY, PHOTOGRAPHS, GLOBIGERINOIDES, MANGANESE NODULES, TOPOGRAPHY, SEDIMENT DISTRIBUTION, SEISMIC PROFILE, CORES

66-01957
CHAPTER 16, SOME ASPECTS OF THE GEOCHEMISTRY OF MARINE SEDIMENTS.
TUREKIAN, KARL K.
Publ.Yr: 65 Publ.Type: CHEMICAL OCEANOGRAPHY. VOL. 2, 1965. RILEY, J. P. AND SKIRROW, G. EDS. 508 PAGES. BOOK, PRICE, $18.50, P.81- 126 NO ABS., 24 FIGS., 10 TABLES, 64 REFS.
Descriptors: SEDIMENT, GEOCHEMISTRY, RADIOACTIVE DATING, TRACE ELEMENTS, MANGANESE NODULES

66-01956
CHAPTER 15, ELEMENTAL GEOCHEMISTRY OF MARINE SEDIMENTS.
CHESTER, R.
Publ.Yr: 65 Publ.Type: CHEMICAL OCEANOGRAPHY. VOL. 2, 1965. RILEY, J. P. AND SKIRROW, G. EDS. 508 PAGES. BOOK, PRICE, $18.50, P.23- 80 NO ABS., 5 FIGS., 8 TABLES, 108 REFS.
Descriptors: TRACE ELEMENTS, GEOCHEMISTRY, SEDIMENT, MANGANESE NODULES

66-01594
VOLCANIC ROCK FROM CARYN SEAMOUNT.
FEDEN, ROBERT H.
Publ.Yr: 66 Publ.Type: JOURNAL OF GEOPHYSICAL RESEARCH. VOL. 71, NO. 6, MARCH 15,1966. P.1761-1763 NO ABS., 1 FIG., 1 TABLE, 9 REFS. ALSO IN, CONTRIBUTION NO. 1674 FROM WOODS HOLE OCEANOGR. INST.
Descriptors: MANGANESE NODULES, CARYN SEAMOUNT, VOLCANIC ROCK , LETTER, MUD

66-00829
MANGANESE NODULES- THEIR EVOLUTION.
BENDER, MICHAEL L.; KU, TEH-LUNG; BROECKER, WALLACE S.
Publ.Yr: 66 Publ.Type: SCIENCE. VOL. 151, NO. 3708, JAN.21,1966. P.325-328 ABS., 3 FIGS., 2 TABLES, 14 REFS. ALSO IN CONTRIBUTION NO. 867 LAMONT GEOL. OBSERV.
Descriptors: MANGANESE DISTRIBUTION, GEOCHEMISTRY, SEDIMENTATION, NODULE DISTRIBUTION, COPPER, COBALT, ACCUMULATION RATE, NICKEL

65-08267
PETROLOGY OF SUBMARINE VOLCANICS AND SEDIMENTS IN THE VICINITY OF THE MENDOCINO FRACTURE ZONE.
NAYUDU, Y. R.
Publ.Yr: 65 Publ.Type: PROGRESS IN OCEANOGRAPHY. VOL. 3, 1965. SEARS, MARY ED. WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASSACHUSETTS. 409 PAGES, P.207-220 PLUS 4 PLATES, 2 FOLD. IN ENGLISH. ENG. ABS., 4 FIGS., 1 TABLE, 35 REFS. ALSO IN, CONTRIBUTION NO. 326 OF THE DEPARTMENT OF OCEANOGRAPHY, UNIVERSITY OF WASHINGTON.
Descriptors: VULCANISM, SEDIMENT, PETROLOGY, CORES, TOPOGRAPHY, MANGANESE, NODULES, DISTRIBUTION, DESCRIPTION, BASALT, CALIFORNIA COAST, SUBMARINES, MENDOCINO FRACTURE ZONE, PETROGRAPHY

65-08253
NEPTUNISM AND VULCANISM IN THE OCEAN.
ARRHENIUS, G.; BONATTI, E.
Publ.Yr: 65 Publ.Type: PROGRESS IN OCEANOGRAPHY. VOL. 3, 1965. SEARS, MARY ED. WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASSACHUSETTS. 409 PAGES, P.7-22 IN ENGLISH, ENG. ABS., 4 FIGS., 1 TABLE, 42 REFS.
Descriptors: SILICATES, TRACERS, FLOOR, NEPTUNISM, HALMEIC, FRACTIONATION, AUTHIGENIC, MINERALS, MANGANESE, NODULES, VULCANISM, BARIUM, DISTRIBUTION, ALUMINUM, RARE EARTHS

65-04259
CHAPTER 6, THE DEEP-SEA FLOOR.
MERO, J. L.
Publ.Yr: 65 Publ.Type: THE MINERAL RESOURCES OF THE SEA, 1965. MERO, JOHN L. ED. P.103-241.
Descriptors: SEDIMENT, FORMATION, DEEP-SEA, FLOOR, DISTRIBUTION, ATLANTIC OCEAN, MANGANESE, NODULES, METALS, INDIAN OCEAN

65-04222
MICROBIAL TRANSFORMATIONS OF MINERALS.
EHRLICH, H. L.
Publ.Yr: 64 Publ.Type: PRINCIPLES AND APPLICATION IN AQUATIC MICROBIOLOGY, 1964. HEUKELEKIAN, H. AND DONDERO, NORMAN C., ED. P.43-60 REFS.
Descriptors: PELAGIC, SEAWATER, NODULES, MANGANESE, MINERALS, CYCLES, BACTERIA, MICROBES, POLLUTION, SEDIMENT

65-03858
CHAPTER 8, MANGANESE NODULES.
MENARD, H. W.
Publ.Yr: 64 Publ.Type: MARINE GEOLOGY OF THE PACIFIC, 1964. MENARD, H. W. ED. P.171-190.
Descriptors: MINERALS, MANGANESE, ECONOMICS, NODULES, RESOURCES, FERROMANGANESE, FORMATION, DISTRIBUTION, NICKEL, COBALT

65-03707
THE ORIGIN OF MANGANESE NODULES ON THE OCEAN FLOOR.
BONATTI, E.; NAYUDU, Y.
Publ.Yr: 65 Publ.Type: AMERICAN JOURNAL OF SCIENCE, VOL. 263, NO. 1, JAN.1965. P.17-39 ABS., REFS.
Descriptors: PACIFIC OCEAN, NODULES, MANGANESE, GEOCHEMISTRY, ORIGIN

64-02512
MINERAL WEALTH FROM THE OCEAN DEEPS.
MERO, J. L.
Publ.Yr: 64 Publ.Type: DISCOVERY, VOL. 25, NO. 7, JUL.1964. P.18-23.
Descriptors: MINERALS, MANGANESE, RED CLAY, SEDIMENT, FLOOR, NODULES, PACIFIC OCEAN, MINING, METALS

64-01427
ON THE AGE OF IRON--MANGANESE CONCRETIONS FROM THE INDIAN AND PACIFIC OCEANS.
NIKOLAYEV, D. S.
Publ.Yr: 63 Publ.Type: GEOCHEMISTRY #7, 1963. P.703-714 ABS., BIBLIOG.
Descriptors: PACIFIC OCEAN, SEDIMENT, RADIOACTIVITY, IRON, MANGANESE, INDIAN OCEAN, RATES, NODULES, CONCRETIONS

64-01425
DATA ON THE GEOCHEMISTRY OF MANGANESE NODULES FROM THE INDIAN OCEAN.
PACHADZHANOV, D. N.
Publ.Yr: 63 Publ.Type: GEOCHEMISTRY #5, 1963. P.520-527 ABS., BIBLIOG.
Descriptors: RED CLAY, INDIAN OCEAN, FORMATION, NIOBIUM, MANGANESE, TITANIUM, TRACE ELEMENTS, TANTALUM, NODULES

64-00457
PYRENE AND FLUORANTHENE IN MANGANESE NODULES.
THOMAS, D. W.
Publ.Yr: 64 Publ.Type: SCIENCE JAN.3,1964. P.39 ABS., BIBLIOG.
Descriptors: NODULES, FLUORANTHENE, PYRENE, HYDROCARBONS, MANGANESE, BLAKE PLATEAU

64-00366
ORIGIN OF OCEANIC MANGANESE MINERALS.
ARRENHIUS, G.
Publ.Yr: 64 Publ.Type: SCIENCE APR.10,1964. P.170-172 ABS., BIBLIOG.
Descriptors: ORIGIN, COLBALT, MANGANESE, THORIUM, NODULES

64-00112
CHEMICAL COMPOSITION OF THE PACIFIC OCEANS IRON-MANGANESE CONCRETIONS.
SKORNYAKOVA, N. S.
Publ.Yr: 64 Publ.Type: DEEP-SEA RESEARCH JAN.-FEB.1964. P.93-104 BIBLIOG.
Descriptors: CONCRETIONS, NODULES, IRON, MANGANESE, PACIFIC OCEAN

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